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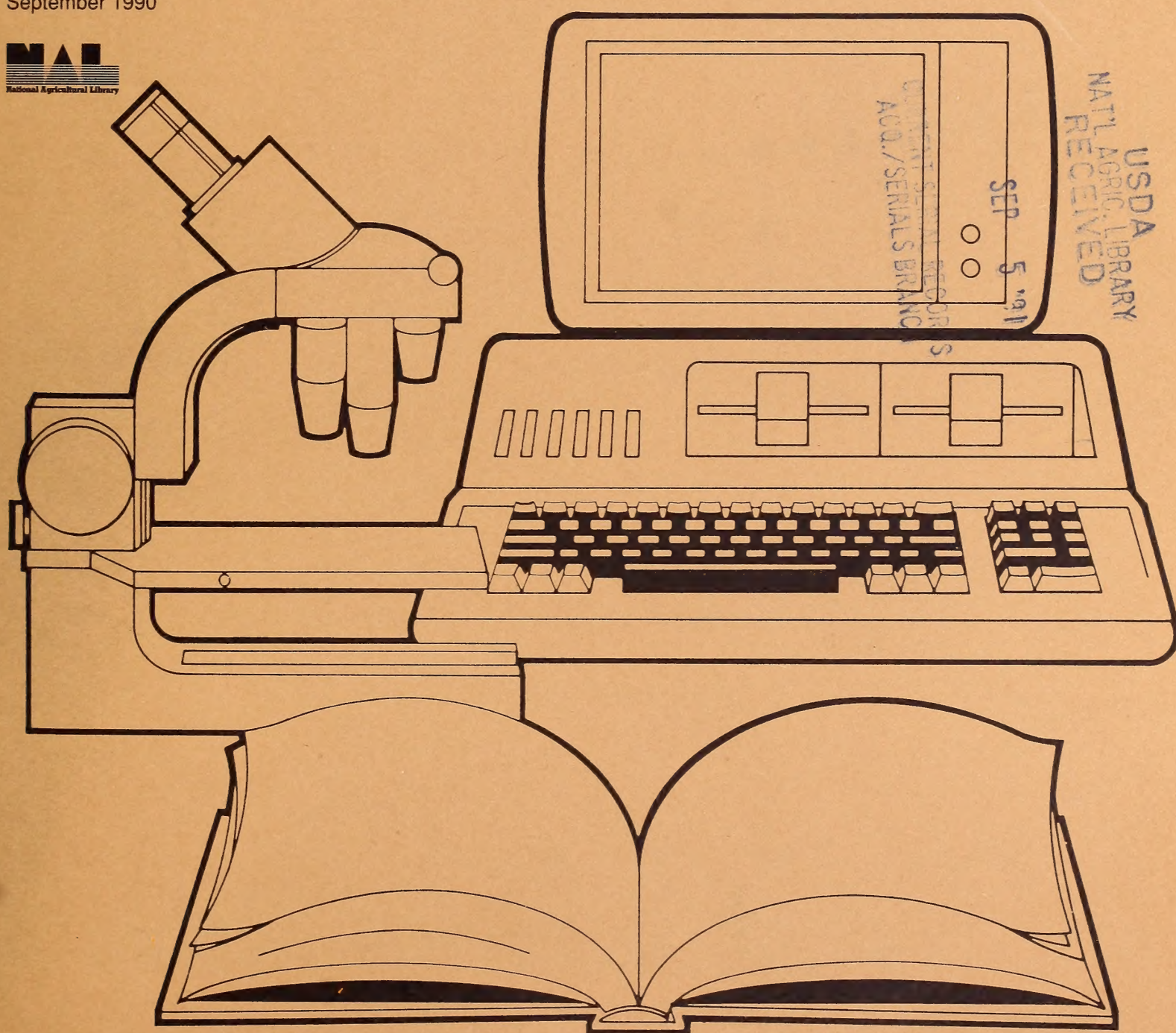
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Number 99

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# The Protection of Forestry, 1985 - 1989

## Citations from AGRICOLA Concerning Diseases and other Environmental Considerations











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**Compiled and Edited by**

Charles N. Bebee  
National Agricultural Library

National Agricultural Library  
Beltsville, Maryland  
1990



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## FOREWORD

This is the 38th volume in a series of commodity-oriented environmental bibliographies resulting from a memorandum of understanding between the U.S. Department of Agriculture, National Agricultural Library (USDA-NAL), and the U.S. Environmental Protection Agency, Office of Pesticide Programs (EPA-OPP).

This close working relationship between the two agencies will produce a series of bibliographies which will be useful to EPA in the regulation of pesticides, as well as to any researcher in the field of plant or commodity protection. The broad scope of information contained in this series will benefit USDA, EPA, and the agricultural community as a whole.

The sources referenced in these bibliographies include the majority of the latest available information from U.S. publications involving commodity protection throughout the growing and processing stages for each agricultural commodity.

We welcome the opportunity to join this cooperative effort between USDA and EPA in support of the national agricultural community.

JOSEPH H. HOWARD, Director  
National Agricultural Library

DOUGLAS D. CAMPT, Director  
Office of Pesticide Programs







## INTRODUCTION

The citations in this bibliography, The Protection of Forestry, are selected from the AGRICOLA (AGRICultural OnLine Access) database limited to those produced by North American authors. They cover articles or monographic publications added to the database from 1985 - 1989.

This is the 38th bibliography in a series of commodity-oriented listings of citations from AGRICOLA jointly sponsored by the U.S. Department of Agriculture, National Agricultural Library (USDA-NAL), and the U.S. Environmental Protection Agency, Office of Pesticide Programs (EPA-OPP). Additional volumes issued recently include The Protection of Cotton, 1985 - 1989, The Protection of Soybeans, 1985 - 1989, The Protection of Small Fruits and Berries, The Protection of Grapes and Cherries, The Protection of Ornamental Plants, The Protection of Farm Animals, and The Protection of Wildlife and Vertebrate Pest Control. The 1990 volumes include The Protection of Tropical and Subtropical Fruits, The Protection of Small Grains (other than Wheat, Rice or Sorghums), The Protection of Cucurbits, The Protection of Minor Vegetable Crops, The Protection of Beans, Peas, and Lentils, and The Protection of Forestry.

Entries in the bibliography are subdivided into a series of section headings used in the contents of the Bibliography of Agriculture. Each item appears under every section heading assigned to the cited document. A personal author index is also included in the publication. The site index to plants that would normally follow the personal author index will be printed separately. Copies of the site index may be obtained from the address below.

The U.S. Environmental Protection Agency contact for this project is Richard B. Peacock, Office of Pesticides and Toxic Substances.

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## **Application of growth models for simulating genetic gain of loblolly pine.**

FOSCA. Knowe, S.A. Foster, G.S. Bethesda, Md. : Society of American Foresters. A technique for predicting genetic gain in progeny tests using height-age models and stand-stimulations is presented for loblolly pine (*Pinus taeda* L.). Periodic remeasurements for a block-plot open-pollinated progeny test are used to examine trends in height growth, selection differential, and percent gain in height and volume. Using the Chapman-Richards model and approximate F tests, significant differences among families were detected in asymptote and rate parameters but not for the shape parameter. Separate base-age invariant height-age equations were developed for each family to account for polymorphism associated with the rate parameter. Selection differential calculated from either observed or predicted heights exhibited similar-trends although estimates from the height-age equations are consistently higher than obtained with observed height after age 5. Family rankings using the height-age models are consistent with those obtained using observed heights. Also, percent gain calculated from predicted heights is within 2% of the estimates obtained with observed heights at ages greater than 3 years. Differences in survival, height, and diameter were combined to examine trends in volume production associated with families. Predicted volume for each family was simulated using a bivariate distribution of height and diameter accounting for differences in height-growth patterns among families. Family rankings for volume are also closely correlated, resulting in two or three of the same families being selected using observed and predicted data. Selection differential obtained from simulated and observed volume fluctuates in rank producing a satisfactory trend based on predicted volume after age 5. Gain based on simulated volume tends to be slightly greater than gain based on observed volume. Estimates of percent gain obtained by reinitializing the simulations with quadratic mean dbh and residual trees per acre after thinning differed more from the observed trends than Forest science. Mar 1989. v. 35 (1). p. 211-228. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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ECOLA. Ketcham, R.B. Eisenberg, R.M. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Oct 1989. v. 70 (5). p. 1425-1433. Includes references. (NAL Call No.: DNAL 410 EC7).

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HJHSA. Tao, R. Sugiura, A. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1987. v. 22 (5). p. 932-935. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

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FOSCA. White, T.L. Bethesda, Md. : Society of American Foresters. Forest science. June 1987. v. 33 (2). p. 283-293. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0196

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FOSCA. DeBell, D.S. Silen, R.R.; Radwan, M.A.; Mandel, N.L. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1986. v. 32 (3). p. 643-652. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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FOSCA. Magnussen, S. Bethesda, Md. : Society of American Foresters. A competition model based on the height difference between a subject tree and its neighbors was used to adjust annual growth data (age 1-5) in a close-spaced single tree plot trial of 25 open-pollinated *Pinus*

*banksiana* progenies. Competition effects in tree height, basal area, and volume growth were estimated within each of eight classes of dominance suppression. This procedure allowed a differential adjustment of family performances to their large plot expectations. It is limited to the absence of competition effects on height growth. Response to competition was the same in all families. Variance components and heritability estimates of basal area and stem volume were inordinately inflated by competition. Forest science. June 1989. v. 35 (2). p. 532-547. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0199

**Effects of ozone or sulfur dioxide on pitch pine seedlings.**

JEVQAA. Scherzer, A.J. McClenahan, J.R. Madison, Wis. : American Society of Agronomy. Pitch pine seedlings (*Pinus rigida* Mill.) were fumigated with O<sub>3</sub> or SO<sub>2</sub> to determine their effects on growth and symptom expression. Seedlings fumigated twice with 0.20 microliter O<sub>3</sub>L-1 for 4 hr at age 14 and 22 wk had significantly greater shoot weight than those fumigated with 0.30 microliter O<sub>3</sub>L-01; 0, 0.08, 0.10, and 0.15 microliter L-1 were intermediate and not significantly different. Root starch content tended to decrease with increasing O<sub>3</sub> with control seedlings being significantly higher than the 0.15, 0.20, and 0.30 microliter O<sub>3</sub>L-1 treatments. Root starch of seedlings treated with 0.20, 0.50, 0.60, 0.70, and 0.90 microliter SO<sub>2</sub>L-1 was significantly lower than the controls. Seedlings from six families fumigated for 5 wk starting at age 6 wk differed in direction and degree of growth response when exposed to 0.08 and 0.30 microliter O<sub>3</sub>L-1. Significant differences existed among families for needle weight, shoot weight, and total weight. No differences were found among O<sub>3</sub> treatments within a family, but patterns suggest some pitch pine individuals may be sensitive to low O<sub>3</sub> while others are stimulated. Visible injury consisted of light chlorotic mottle on oldest needles. Discriminant function analysis indicated that growth responses were indistinguishable among families receiving no treatment; however, treated seedlings could be classified based on various height measurements and/or shoot weight. Differences in visible injury were apparent among families of seedlings treated with 0.40 microliter O<sub>3</sub>L-1, indicating some pitch pine families are more sensitive to O<sub>3</sub> than others. Journal of environmental quality. Jan/Mar 1989. v. 18 (1). p. 57-61. Includes references. (NAL Call No.: DNAL QH540.J6).

0200

**The effects of seed origin on drought resistance of lodgepole pine (*Pinus contorta* Dougl.) seedlings.**

Murdiyarso, D. Roberts, J.M.; Milford, J.R. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology,



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May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 154-156. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

### 0201

#### **Elm tree named Independence.**

Smalley, E.B. Lester, D.T. Washington, D.C. : The Office. An elm tree characterized by high resistance to Dutch Elm Disease. Plant patent - United States Patent and Trademark Office. July 19, 1988. (6227). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

### 0202

#### **Estimates of genetic parameters for deer browsing of Douglas-fir.**

FOSCA. Silen, R.R. Randall, W.K.; Mandel, N.L. Bethesda, Md. : Society of American Foresters. Forest science. Literature review. Mar 1986. v. 32 (1). p. 178-184. Includes references. (NAL Call No.: DNAL 99.8 F7632).

### 0203

**Experimental studies of ponderosa pine. II. Quantitative genetics of morphological traits.**  
AUBOAA. Grant, M.C. Linhart, Y.B.; Monson, R.K. Columbus, Ohio : Botanical Society of America. American journal of botany. July 1989. v. 76 (7). p. 1033-1040. Includes references. (NAL Call No.: DNAL 450 AM36).

### 0204

#### **Experimental studies of ponderosa pine. III. Differences in photosynthesis, stomatal conductance, and water-use efficiency between two genetic lines.**

AUBOAA. Monson, R.K. Grant, M.C. Columbus, Ohio : Botanical Society of America. American journal of botany. July 1989. v. 76 (7). p. 1041-1047. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

### 0205

#### **The fall and rise of the beloved elm.**

ANURA. Robinson, D. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. May 1, 1987. v. 165 (9). p. 121-122, 124, 126, 128. ill. (NAL Call No.: DNAL 80 AM371).

### 0206

#### **First-year growth of hybrid poplar shoots from cutting or coppice origin.**

FOSCA. Bergez, J.E. Auclair, D.; Bouvarel, L. Bethesda, Md. : Society of American Foresters. Height growth, mortality, and dry woody biomass were studied on hybrid poplar shoots during their first year after coppicing or during the year of establishment from cuttings. Two coppice treatments (1- and 2-year rotations) and two treatments for cuttings (irrigated or not) were compared. A slight delay was observed in the height growth of cuttings compared to coppice treatments, but total height growth was not significantly different between treatments at the end of the growing season. Irrigation reduced mortality during establishment of cuttings. Total biomass produced was higher in the coppice stands, due to a greater number of shoots per stool. Coppice maintained its growth capacity even after the fifth 1-year cycle. Forest science. Dec 1989. v. 35 (4). p. 1105-1113. Includes references. (NAL Call No.: DNAL 99.8 F7632).

### 0207

#### **Forest biology research and the 21st century.**

YAXAA. Krugman, S.L. McDonald, S.E. Washington, D.C. : U.S. Department of Agriculture. The Yearbook of agriculture. 1986. p. 206-208. ill. (NAL Call No.: DNAL 1 AG84Y).

### 0208

#### **Gene exchange in loblolly pine: the relation between pollination mechanism, female receptivity and pollen availability.**

AUBOAA. Greenwood, M.S. Baltimore, Md. : Botanical Society of America. American journal of botany. Oct 1986. v. 73 (10). p. 1443-1451. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

### 0209

#### **Genetic improvement effects on growth and yield of loblolly pine plantations.**

FOSCA. Buford, M.A. Burkhart, H.E. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1987. v. 33 (3). p. 707-724. Includes references. (NAL Call No.: DNAL 99.8 F7632).

### 0210

#### **Genetic variation in douglas-fir: a 20-year test of provenances in eastern Nebraska.**

Van Haverbeke, D.F. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. July 1987. (141). 8 p. maps. Includes references. (NAL Call No.: DNAL aSD11.A42).

0211

**The genome of *Entomophaga aulicae* (Entomophthorales, Zygomycetes): base composition and size.**

EXMYD. Murrin, F. Holtby, J.; Nolan, R.A.; Davidson, W.S. Orlando, Fla. : Academic Press. Experimental mycology. Mar 1986. v. 10 (1). p. 67-75. ill. Includes references. (NAL Call No.: DNAL QK600.E9).

0212

**Geographic variation of red pine survival, growth and productivity in a Minnesota field test.**

Nelson, C.D. Mohn, C.A.; Stewart, W.K. Madison, Wis. : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. Conference held August 10-12, 1987, Fargo, North Dakota. 1987? . p. 43-50. maps. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0213

**Green ash named 'Wasky'.**

Wandell, W.N. Washington, D.C. : The Office. A male green ash tree having a strong central leader, strongly ascending uniformly spaced scaffold branches, uniform crotch angles, and heavy stems, forming an attractive, narrowly oval tree of compact appearance and low pruning requirements; further, the subject tree develops a heavy furrowed protective bark at an early age on the bole and branches progressing from smooth juvenile ash-gray bark slightly tinged with red. Fall foliage color is ephemeral turning to bronze-red with heavy autumn frosts. Plant patent - United States Patent and Trademark Office. Sept 19, 1989. (7036). 2 p. plates. (NAL Call No.: DNAL 156.65 P69).

0214

**Growth and survival of eastern cottonwood in Kentucky.**

SJAFD. Stringer, J.W. Shain, L.; Wittwer, R.F. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1987. v. 11 (2). p. 73-76. Includes references. (NAL Call No.: DNAL SD1.S63).

0215

**Growth and survival of hybrid poplar and *Populus deltoides* clones in east central Wisconsin.**

Wyckoff, G.W. Einspahr, D.W.; Dinus, R.J. Madison, Wis. : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. Conference held August 10-12, 1987, Fargo, North Dakota. Includes statistical data. 1987? . p. 187-196. Includes references. (NAL

Call No.: DNAL SD399.5.N6).

0216

**Growth rate variation in *Quercus rubra* in three north central U.S. provenance tests by age 23.**

Kriebel, H.B. Merritt, C.; Stadt, T. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 79-81. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0217

**Heritability in sugar maple families suggest breeding for response to wounding would pay.**

Garrett, P.W. Funk, D.T.; Hawley, G.J.; Wendel, G.W. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. June 1989. v. 6 (2). p. 59-61. ill. Includes references. (NAL Call No.: DNAL SD143.N6).

0218

**How effective are tree improvement programs in the 50 states?.**

Risbrudt, C.D. McDonald, S.E. St. Paul, Minn. : The Station. USDA Forest Service research paper NC - North Central Forest Experiment Station. 1986. (276). 6 p. maps. Includes references. (NAL Call No.: DNAL aSD11.A34).

0219

**Implications of research on lodgepole pine introduction in interior Alaska.**

XFPNA. Alden, J.N. Portland, Or. : The Station. Research paper PNW - U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Sept 1988. (402). 29 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

0220

**Influence of host genotype on Douglas-fir seed losses to *Contarinia oregonensis* (Diptera: Cecidomyiidae) and *Megastigmus spermotrophus* (Hymenoptera: Torymidae) in western Oregon.**

EVETEX. Schowalter, T.D. Haverty, M.I. Lanham, Md. : Entomological Society of America. Seed losses to the Douglas-fir cone gall midge, *Contarinia oregonensis* Foote, and Douglas-fir seed chalcid, *Megastigmus spermotrophus* (Wachtl), were measured in a Douglas-fir, *Pseudotsuga menziesii* (Mirbel) Franco, clonal seed orchard and in a Douglas-fir progeny plantation in western Oregon. Seed losses to both insects differed significantly ( $P$  less than 0.05) among clones and among the progeny of selected parental crosses. Seed loss differed more than three times between



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least-infested and most-infested clones or progeny. Seed losses in the progeny plantation indicated that resistance to these two insects is a heritable trait, with greater resistance showing a tendency to dominate over lesser resistance. Insect responses to host genotype may be modified by factors associated with the position of the tree within the stand. Implications of these results for tree improvement programs and seed orchard management are discussed. Environmental entomology. Feb 1989. v. 18. p. 94-97. Includes references. (NAL Call No.: DNAL QL461.E532).

0221

### **Injury and biology of the clearwing borer *Synanthedon kathyae* on holly.**

JLPSA. Ghidui, G.M. Vasvary, L.; Eichlin, T.D.; Solomon, J.D. Los Angeles, Calif. : The Society. Journal of the Lepidopterists' Society. Oct 7, 1987. v. 41 (3). p. 154-158. ill. Includes references. (NAL Call No.: DNAL 421 L554).

0222

### **Interaction of genotype and vegetation control on loblolly pine seedling performance.**

Duba, S.E. Nelson, L.R.; Gjerstad, D.H. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 305-308. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

0223

### **Long generation times in breeding trees--a pest management blessing in disguise.**

Stack, R.W. Madison, Wis. : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. Conference held August 10-12, 1987, Fargo, North Dakota.~ Literature review. 1987? . p. 72-81. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0224

### **Matching loblolly pine families to regeneration sites.**

SJAFD. Duzan, H.W. Jr. Williams, C.G. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1988. v. 12 (3). p. 166-169. Includes references. (NAL Call No.: DNAL SD1.S63).

0225

### **Microclimate modification in a jack pine seed orchard.**

Street, R.B. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. Prevention of contamination by windborne "foreign" pollen. p. 248-251. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

0226

### **Micropropagation of Eucalyptus cloning candidates in Florida.**

Howland, G.P. Meskimen, G.; Constantin, M.J. New York : Plenum Press, c1986. Biomass energy development / edited by Wayne H. Smith. Paper presented at the "Third Southern Biomass Energy Research Conference," March 12-14, 1985, Gainesville, Florida. p. 111-118. Includes references. (NAL Call No.: DNAL TP360.S68 1985).

0227

### **Patterns of leader elongation in loblolly pine families.**

FOSCA. Bridgwater, F.E. Williams, C.G.; Campbell, R.G. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1985. v. 31 (4). p. 933-944. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0228

### **Performance of Livingston Parish loblolly pine in the Georgia Piedmont.**

SJAFD. Powers, H.R. Jr. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1986. v. 10 (2). p. 84-87. ill., maps. Includes references. (NAL Call No.: DNAL SD1.S63).

0229

### **Performance of range-wide provenances of northern white-cedar in three central Illinois plantations over a 20-year period.**

Jokela, J.J. Savka, M.A. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 107-111. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0230

**Phenological and morphological responses of mesic and dry site sources of coastal Douglas-fir to water deficit.**

FOSCA. Joly, R.U. Adams, W.T.; Stafford, S.G. Bethesda, Md. : Society of American Foresters. Patterns of genetic variation in morphological and phenological responses to water deficit are described in seedling progeny of four populations of coastal Douglas-fir (*Pseudotsuga menziesii* Mirb. Franco var. *menziesii*), sampled from coastal and inland sites in Oregon. Progeny of coastal and inland populations differed for all traits measured, and differences appear to reflect adaptation to the source environment. Inland populations were characterized by early budset, slower rates of shoot extension, and higher root-shoot ratios. A significant fraction of total variability was attributable to differences among families within populations. Little evidence for irrigation x population interaction was found when seedling traits were examined singly. Of 16 traits analyzed, only average daily rate of growth and seedling height had significant interaction terms. Interactions between irrigation and families-within-population were more prevalent. A canonical discriminant analysis was used to identify a subset of variables that best reveals differences among progeny of coastal and inland populations. Implications for seed transfer and for selection and breeding of genotypes suitable for xeric environments are discussed. Forest science. Dec 1989. v. 35 (4). p. 987-1005. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0231

**Physiological and morphological responses of three half-sib families of loblolly pine to water-stress conditioning.**

FOSCA. Seiler, J.R. Johnson, J.D. Bethesda, Md. : Society of American Foresters. Abstract: The effect of water-stress conditioning on drought tolerance of three open-pollinated families of loblolly pine (*Pinus taeda* L.) during water stress was investigated. Seedlings were subjected to one of two levels of prolonged, sublethal drought or were kept well watered. After the conditioning period, photosynthesis, transpiration, and growth were evaluated. Photosynthesis was decreased greatly with reduced needle water potential. Conditioned seedlings generally maintained positive net photosynthesis to water potentials 0.15 (moderate water-stress conditioning) and 0.40 (severe water-stress conditioning) MPa lower than those of control seedlings. This response was likely the result of an acclimation of the photosynthetic process resulting in less nonstomatal inhibition of photosynthesis at low needle water potentials. Under well-watered conditions, transpiration, but not photosynthesis, was reduced greatly by the conditioning treatments and resulted in improved water-use efficiency. Root growth was affected more by water stress than shoot growth, causing a decrease in root/shoot ratio. Genetic differences in photosynthetic

acclimation were not apparent. However, compared to seedlings representing two Virginia seed sources, a family from Texas, known for its superior drought tolerance, had the lowest root/shoot ratio and the least change in transpiration in response to water-stress conditioning. FOR. SCI. 34(2):487-495. Forest science. June 1988. v. 34 (2). p. 487-495. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0232

**Plant growth regulator-directed phase specificity in cell and tissue culture for tree improvement.**

Durzan, D.J. Bethesda, Md. : The Society. Proceedings of the... Society of American Foresters National Convention. 1986. p. 218-222. ill. Includes references. (NAL Call No.: DNAL SD143.S64).

0233

**Pollinizer management in a hazelnut orchard.**

PNGOA. Mehlenbacher, S.A. Miller, A.N. Tigard, Or. : The Society. Proceedings of the Nut Growers Society of Oregon, Washington & British Columbia. Meeting held on January 27, 1988, Portland, Oregon. 1988. (73rd). p. 67-71, 73-75, 77-78, 80-81. Includes references. (NAL Call No.: DNAL 94.69 W52).

0234

**Polymix crosses for rust resistance screening.**

Byram, T.D. Lowe, W.J.; McKinley, C.R. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 39-44. Includes references. (NAL Call No.: DNAL A99.9 F769).

0235

**Potato leafhopper injury variation among *Acer rubrum*.**

ANURA. Townsend, A.M. Chicago, Ill. : American Nurseryman Publishing Company. American nurseryman. Aug 1, 1989. v. 170 (3). p. 83-86. (NAL Call No.: DNAL 80 AM371).

0236

**Recent advances in insect control in pine seed orchards.**

Weatherby, J.C. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 16-23. Includes references. (NAL Call No.: DNAL 99.9 L935).



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0237

**Reduction of initial plagiotropic growth of softwood 'Fraser' fir cuttings.**

JOSHB. Wise, F.C. Blazich, F.A.; Hinesley, L.E. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Jan 1986. v. 111 (1). p. 21-26. ill. Includes 21 references. (NAL Call No.: DNAL 81 S012).

0238

**Regeneration of shoots from leaf disk explants of black locust, *Robinia pseudoacacia* L.**

Davis, J.M. Keathley, D.E. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 29-34. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0239

**Resistance of plants at the population level to attack by phytophagous insects.**

Lunderstadt, J. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 131-137. ill. Includes references. (NAL Call No.: DNAL SB761.M46).

0240

**Resistance of ponderosa pine to the gouty pitch midge (*Cecidomyia piniinopis*).**

XFIPA. Hoff, R.J. Ogden, Utah : The Station. USDA Forest Service research paper INT - Intermountain Research Station. Feb 1988. (387). 3 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764U).

0241

**Risks to agriculture and forestry arising from the industrial use of phytopathogenic microorganisms.**

Smith, I.N. Philadelphia : Balaban Publishers. Symbiosis. Paper presented at the "Conference on the Present and Potential Uses of Parasitic and Symbiotic Plant Microorganisms," April 14-17, 1986, Paris. 1986. v. 2 (1/3). p. 275-285. Includes references. (NAL Call No.: DNAL QH548.S9).

0242

**Role of tree improvement in providing pest-resistant eastern white pine (*Pinus strobus* L.).**

GTRWD. Garrett, P.W. Washington, D.C. : The Service. General technical report WO - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern

White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 75-88. ill. Includes references. (NAL Call No.: DNAL ASD11.U52).

0243

**The role of water stress in tree growth.**

JOARD. Kramer, P.J. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Feb 1987. v. 13 (2). p. 33-38. Includes references. (NAL Call No.: DNAL SB436.U6).

0244

**Rugged woodies: In North Dakota, weather extremes test plant hardiness all year long. These woody ornamentals would make hardy candidates for similar climates across the country.**

ANURA. Smith, R.C. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Includes list of 44 winter-hardy crabapple cultivars. Jan 1, 1988. v. 167 (1). p. 134-143. ill. (NAL Call No.: DNAL 80 AM371).

0245

**Seasonal and genetic variations in loblolly pine cold tolerance.**

FOSCA. Kolb, T.E. Steiner, K.C.; Barbour, H.F. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1985. v. 31 (4). p. 926-932. maps. Includes 15 references. (NAL Call No.: DNAL 99.8 F7632).

0246

**Seed source influences juniper seedling survival under severe drought stress.**

XARRA. Tauer, C.G. Harris, K.D.; Van Haverbeke, D.F. Fort Collins, Colo. : The Station. USDA Forest Service research note RM - United States, Rocky Mountain Forest and Range Experiment Station. July 1987. (470). 4 p. maps. Includes references. (NAL Call No.: DNAL A99.9 F7632US).

0247

**Selecting Carpathian walnuts (*Juglans regia* L.) for cold hardiness.**

NONGA. Domoto, P.A. Hamden, Conn. : The Association. Annual report of the Northern Nut Growers Association. Includes report for work from 1971-1986. 1986. (77th). p. 21-26. Includes references. (NAL Call No.: DNAL 94.69 N81).

0248

**Selection and clonal propagation of Eucalyptus.**

CAGRA. Sachs, R.M. Lee, C.; Ripperda, J.; Woodward, R. Berkeley, Calif. : The Station. California agriculture - California Agricultural Experiment Station. Nov/Dec 1988. v. 42 (6). p. 27-31. ill. (NAL Call No.: DNAL 100 C12CAG).

0249

**Sensitivity of forest plant reproduction to long-range transported air pollutants: the effects of wet deposited acidity and copper on reproduction of Populus tremuloides.**

NEPHA. Cox, R.M. New York, N.Y. : Cambridge University Press. The New phytologist. Sept 1988. v. 110 (1). p. 33-38. Includes references. (NAL Call No.: DNAL 450 N42).

0250

**Shortening generations.**

JFUSA. Greenwood, M.S. Bethesda, Md. : Society of American Foresters. Journal of forestry. Jan 1986. v. 84 (1). p. 38-39. ill. (NAL Call No.: DNAL 99.8 F768).

0251

**Soil-microsite differentiation, growth and genetic variation of lodgepole pine in the foothills of Alberta, Canada.**

CSOSA2. Florence, L.Z. Dancik, B.P. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May/Sept 1988. v. 19 (7/12). p. 1105-1116. Includes references. (NAL Call No.: DNAL S590.C63).

0252

**Somatic variation in resistance of Populus to Septoria musiva.**

PLDIDE. Ostry, M.E. Skilling, D.D. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1988. v. 72 (8). p. 724-727. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

0253

**Sources of variation in osmotic potentials with special reference to North American tree species.**

FOSCA. Abrams, M.D. Bethesda, Md. : Society of American Foresters. The purpose of this review is to discuss sources of variation in osmotic potentials (psi pi), with special reference to North American tree species. Lowering of osmotic potentials by solute accumulation (osmotic adjustment) has been reported in a wide variety of tree species during drought, but not in all species. Osmotic potentials at

zero turgor for 37 tree species throughout the United States and Canada averaged (+/- s.e.) -2.06 +/- 0.13 MPa and -2.54 +/- 0.06 MPa for leaves or shoots under moist and dry conditions, respectively. The low standard error associated with the mean values suggest that, as a group, North American trees develop fairly similar osmotic potentials for a range of moisture conditions. Substantial solute accumulation often routinely occurs in developing leaves and in over-wintering leaves. Drought preconditioning can increase physiological activity in plants during subsequent drought by lowering psi pi. However, if drought is imposed too rapidly osmotic adjustment may not occur. Physiological plasticity in trees may cause variations in psi pi in responses to light regime and leaf canopy position. Light and nutrient regimes that promote high net photosynthesis should also promote the ability to osmotically adjust. However, stomatal responses and growth during water and nutrient stress may be unrelated to osmotic potentials because of species differences in rooting and water transport, guard cell turgor not being closely coupled with that of the bulk leaf, and changes in plant growth regulator concentrations. When examining changes in osmotic potentials using pressure-volume curves, it is important to rehydrate plant material to a water potential characteristic for that species at full hydration in the field. Moreover, as with most physiological measurements, sampling variation in light regime, canopy position, nutrient status, temperature, age, phenology, drought history, and diurnal timing of harvesting of the leaves and shoots should be mi. Forest science. Dec 1988. v. 34 (4). p. 1030-1046. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0254

**Survival and growth of black alder (Alnus glutinosa L. Gaertn.) in north central Minnesota.**

Merrill, R.E. Mohn, C.A.; Cromell, W. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 23-28. maps. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0255

**Survival and growth of Tamarack seed sources in ten NC-99 tests.**

Mohn, C.A. Hanover, J.W.; Kang, H.; Stine, R.A. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 112-123. Includes references. (NAL Call No.: DNAL SD399.5.N6).



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0256

### **A tough nut to crack.**

Pleasanton, Calif. : Sun-Diamond Growers of California. Sun-diamond grower. Summer 1988. v. 7 (2). p. 38-39, 46. (NAL Call No.: DNAL SB401.A1D5).

0257

### **Tree crops--the way out.**

Smith, J.R. Emmaus, Pa. : Regenerative Agriculture Association. The New farm. July/Aug 1988. v. 10 (5). p. 40-43. ill. (NAL Call No.: DNAL S1.N32).

0258

### **Twenty-year performances of Scotch, European black (Austrian), red, and jack pines in eastern Nebraska.**

XFRMA. Van Haverbeke, D.F. Fort Collins, Colo. : The Station. USDA Forest Service research paper RM - United States, Rocky Mountain Forest and Range Experiment Station. June 1986. (267). 14 p. ill., maps. Includes references. (NAL Call No.: DNAL A99.9 F7632U).

0259

### **Use of excessive waterlogging and physiological responses to measure genetic variation in loblolly pine waterlogging tolerance.**

Shear, T.H. Hook, D.D. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 146-151. Includes references. (NAL Call No.: DNAL A99.9 F769).

0260

### **Using frost hardiness as an indicator of seedling condition.**

Faulconer, J.R. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 89-95. Includes references. (NAL Call No.: DNAL aSD11.A42).

# PLANT ECOLOGY

0261

**Adaptability of black walnut, black cherry, and northern red oak to northern California.**  
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WOOFUJ. Sachs, I.B. Leatham, G.F.; Myers, G.C. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1989. v. 21 (4). p. 331-342. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

0415

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WOOFUJ. Lowerts, G. Wheeler, E.A.; Kellison, R.C. Madison : Society of Wood Science and Technology. Wood and fiber science. Oct 1986. v. 18 (4). p. 537-552. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

0417

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Wenny, D.L. Woollen, R.L. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Jan 1989. v. 4 (1). p. 15-17. Includes references. (NAL Call No.: DNAL SD388.W6).

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0423

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Yang, C.S. Wilcox, H.E. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 348. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0424

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Briggs, D.G. Mecific, F.; Smith, W.R. Seattle : University of Washington Press, 1986. The Forest alternative for treatment and utilization of municipal and industrial wastes / edited by Dale W. Cole, Charles L. Henry, and Wade L. Nutter. p. 246-257. Includes references. (NAL Call No.: DNAL TD897.F65).

0425

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FOSCA. Zutter, B.R. Gjerstad, D.H.; Glover, G.R. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 1016-1031. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0426

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0427

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0428

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Omi, S.K. Howe, G.T.; Duryea, M.L. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 29-34. maps. Includes references. (NAL Call No.: DNAL aSD11.A42).

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ETOC DK. Ratsch, H.C. Johndro, D.J.; McFarlane, J.C. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1986. v. 5 (1). p. 55-60. ill. Includes 11 references. (NAL Call No.: DNAL QH545.A1E58).

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0431

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AECTCV. Maurice, C.G. Crang, R.E. New York, N.Y. : Springer-Verlag. Archives of environmental contamination and toxicology. Jan 1986. v. 15 (1). p. 77-82. ill. Includes references. (NAL Call No.: DNAL TD172.A7).

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**Interaction of CCA preservative treatment and redrying: effect on the mechanical properties of southern pine.**  
FPJDA. Winandy, J.E. Boone, R.S.; Bendtsen, B.A. Madison, Wis. : Forest Products Research Society. Forest products journal. Oct 1985. v. 35 (10). p. 62-68. ill. Includes 15 references. (NAL Call No.: DNAL 99.9 F7662J).

0433

**Investigations on the effect of ozone on leaves of pinto bean (*Phaseolus vulgaris* L.) and beech yearlings (*Fagus sylvatica* L.).**  
Masuch, G. Kettrup, A. Deerfield Beach, Fla. : VCH Publishers, c1985. Air pollution and plants / edited by Clement Trojanowsky. Presented at the 2nd "European Conference on Chemistry and the Environment," May 21-24, 1984, Lindau, West Germany. p. 142-145. Includes 3 references. (NAL Call No.: DNAL QK751.E97 1984).

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AMFOA. Shigo, A.A. Washington, D.C. : American Forestry Association. American forests. June 1986. v. 92 (6). p. 18-22, 46-47. ill. (NAL Call No.: DNAL 99.8 F762).

0435

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PRNCA. Fisher, J.B. Theobald, W.F. Lawrence, Kan. : The International Palm Society. Principes. Jan 1989. v. 33 (1). p. 5-17. ill. Includes references. (NAL Call No.: DNAL 80 P932).

0436

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WOSTBE. Ronze, D. Mary, M.; Romeis, M.; Zoulalian, A.; Kauman, W.G. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1988. v. 22 (1). p. 1-9. ill. Includes references. (NAL Call No.: DNAL SD433.A1W6).

0437

**Morphological changes accompanying the transition from juvenile (atmospheric) to adult (tank) forms in the Mexican epiphyte *tillandsia deppeana* (Bromeliaceae).**  
AUBOA. Adams, W.W. III. Martin, C.E. Baltimore, Md. : Botanical Society of America. American journal of botany. Aug 1986. v. 73 (8). p. 1207-1214. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0438

**The nature of waterlogging tolerance of loblolly pine.**  
Hook, D.D. Shear, T. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 51-57. Includes references. (NAL Call No.: DNAL A99.9 F769).

0439

**New interpretation of the inflorescence of *Fagus* drawn from the developmental study of *Fagus crenata*, with description of an extremely monstrous cupule.**  
AUBOAA. Okamoto, M. Columbus, Ohio : Botanical Society of America. American journal of botany. Jan 1989. v. 76 (1). p. 14-22. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0440

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0441

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WOSTBE. Archer, R.R. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1989. v. 23 (4). p. 311-322. Includes references. (NAL Call No.: DNAL SD433.A1W6).

0442

**Ozone and sulfur dioxide effects on the ultrastructure of the chloroplasts of hybrid poplar leaves.**  
BECTA. Pechak, D.G. Noble, R.D.; Dochinger, L. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Mar 1986. v. 36 (3). p. 421-428. ill. Includes references. (NAL Call No.: DNAL RA1270.P35A1).



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**0443**

**Potential in using elemental concentrations in radial increments of old growth eastern redcedar to examine the chemical history of the environment.**

Guyette, R. McGinnes, E.A. Jr. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 671-680. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

**0444**

**Radial variation of collapse, volumetric shrinkage, moisture content and density in Eucalyptus regnans F. Muell.**

WOSTBE. Chafe, S.C. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1986. v. 20 (3). p. 253-262. Includes references. (NAL Call No.: DNAL SD433.A1W6).

**0445**

**Root respiration in white spruce (Picea glauca Moench Voss) seedlings in relation to morphology and environment.**

PLPHA. Johnson-Flanagan, A.M. Owens, J.N. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. May 1986. v. 81 (1). p. 21-25. Includes 24 references. (NAL Call No.: DNAL 450 P692).

**0446**

**The roots of plantation cottonwood: their characteristics and properties.**

XFNSA. Francis, J.K. New Orleans, La. : The Station. U.S. Forest Service research note SO - United States, Southern Forest Experiment Station. Aug 1985. (314). 4 p. Includes references. (NAL Call No.: DNAL A99.9 F7628U).

**0447**

**Sclerotium development in two ectomycorrhizal fungi.**

Grenville, D.J. Piche, Y.; Peterson, R.L. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 438. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

**0448**

**Ultrastructure in leaves of Fagus silvatica and Carpinus betulus individuals tolerant and susceptible to SO2 and heavy metal pollutants.**

EESAD. Stirban, M. Craciun, C.; Bathory, D. Duluth, Minn. : Academic Press. Ecotoxicology and environmental safety. Aug 1988. v. 16 (1). p. 45-56. ill. Includes references. (NAL Call No.: DNAL QH545.A1E29).

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0449

## Acid rain and the spaceship earth.

PIWCA. Curry, N.A. Chelsea, Mich. : Lewis Publishers. Proceedings of the ... Industrial Waste Conference, Purdue University. 1986 c1987. (41st). p. 737-743. Includes references. (NAL Call No.: DNAL TP995.A1I5).

0450

## Aluminum effects on northern red oak seedling growth in six forest soil horizons.

SSSUD4. Joslin, J.D. Wolfe, M.H. Madison, Wis. : The Society. The response of northern red oak (*Quercus rubra* L.) seedlings to varying levels of soil Al was examined in a 16-wk greenhouse study. Forest soil samples representing three soil series were used as growth media: Captina (Fragiudult, Missouri), Lexington (Paleudalf, Mississippi) and Becket (Fragiorothod, New York). Soil from two horizons from each series was separately amended in four treatments to create a wide range of soil Al availability: (i) control, (ii) limed  $\text{Ca}(\text{OH})_2$ , (iii) acidified (HCl), (iv) acidified with supplemental calcium added (+HCl and  $\text{CaSO}_4$ ). Treatments significantly (p less than 0.05) altered soil pH (range 3.65 to 5.48), base saturation, and 0.01 M  $\text{SrCl}_2$ -extractable Al (range 0.6-37.2 mg kg<sup>-1</sup>). Compared to controls, both acidification treatments resulted in significant reductions in fine root and foliar biomass production or in fine root branching, in all horizons except the highly organic Bhs of the Fragiorthod. In the remaining five horizons, fine root branching and biomass production were highly and negatively correlated ( $R^2 = 0.70$  and  $0.50$ , respectively) with 0.01 M  $\text{SrCl}_2$ -extractable Al. Although fine root tissue concentrations of Al correlated highly with 0.01 M  $\text{SrCl}_2$ - extractable Al levels, root tissue Al predicted root branching and biomass only moderately well ( $R^2 = 0.30$  and  $0.21$ , respectively). Fine root branching was more sensitive to treatment effects than either root biomass production or root elongation. Reductions in foliar biomass appeared to be secondary responses to direct effects on root systems. Present soil Al levels and acidic deposition rates appear to pose no threat to northern red oak in the southern portion of its range, whereas the possibility of Al toxicity in northeastern Spodosols deserves further study. Soil Science Society of America journal. Jan/Feb 1989. v. 53 (1). p. 274-281. Includes references. (NAL Call No.: DNAL 56.9 S03).

0451

## Basidiospores of *Rhizopogon vinicolor* and *Rhizopogon colossus* as ectomycorrhizal inoculum.

Castellano, M.A. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p.

211. (NAL Call No.: DNAL aQK604.N6 1984).

0452

## Bayleton (triadimefon) affects ectomycorrhizal development on slash and loblolly pine seedlings in nurseries.

Marx, D.H. Cordell, C.E. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 460-475. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

0453

## Biotechnology applied to the improvement of underground systems of woody plants.

Torrey, J.G. New York : Plenum, c1988. Genetic manipulation of woody plants / edited by James W. Hanover and Daniel E. Keathley ; technical editors Claire M. Wilson and Gregory Kuny. Literature review. p. 1-21. Includes references. (NAL Call No.: DNAL SB123.57.C65 1987).

0454

## Boron and ectomycorrhizal influences on IAA and IAA oxidase activity.

Mitchell, R.J. Atalay, A.; Cox, G.S.; Garrett, H.E. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 338. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

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## Carbohydrate status as a measure of seedling quality.

Marshall, J.D. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. Literature review. p. 49-58. ill. Includes references. (NAL Call No.: DNAL SD404.E93).

0456

## Characteristics of woodland rhizobial populations from surface- and deep-soil environments of the Sonoran Desert.

APMBA. Waldon, H.B. Jenkins, M.B.; Virginia, R.A.; Harding, E.E. Washington, D.C. : American Society for Microbiology. A collection of 74



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rhizobial isolates recovered from nodules of the desert woody legumes *Prosopis glandulosa*, *Psoralea argemone*, and *Acacia constricta* were characterized by using 61 nutritional and biochemical tests. We compared isolates from *A. constricta* and *Prosopis glandulosa* and tested the hypothesis that the rhizobia from a deep-phreatic rooting zone of a *Prosopis* woodland in the Sonoran Desert of southern California were phenetically distinct from rhizobia from surface soils. Cluster analysis identified four major homogeneous groups. The first phenon contained slow-growing (SG) *Prosopis* rhizobia from surface and deep-phreatic-soil environments. These isolates grew poorly on most of the media used in the study, probably because of their requirement for a high medium pH. The second group of isolates primarily contained SG *Prosopis* rhizobia from the deep-phreatic rooting environment and included two fast-growing (FG) *Psoralea* rhizobia. These isolates were nutritionally versatile and grew over a broad pH range. The third major phenon was composed mainly of FG *Prosopis* rhizobia from surface and dry subsurface soils. While these isolates used a restricted range of carbohydrates (including sucrose) as sole carbon sources, they showed better growth on a range of organic acids as sole carbon sources and amino acids as sole carbon and nitrogen sources than did other isolates in the study. They grew better at 36 degrees C than at 26 degrees C. The FG *Acacia* rhizobia from surface-soil environments formed a final major phenon that was distinct from the *Prosopis* isolates. They produced very high absorbance readings on all of the carbohydrates tested except sucrose, grew poorly on many of the other substrates tested, and preferred a 36 to a 26 degree C incubation temperature. The surface populations of *Prosopis* rhizobia required a higher pH for growth and, under the conditions used in this study, were less tolerant of low solute potential and high growth temperature. *Applied and environmental microbiology*. Dec 1989. v. 55 (12). p. 3058-3064. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0457

### **Comparative effects of the soil microflora on ectomycorrhizal inoculation of conifer seedlings.**

NEPHA. McAfee, B.J. Fortin, J.A. New York, N.Y. : Cambridge University Press. *The New phytologist*. Apr 1988. v. 108 (4). p. 443-449. Includes references. (NAL Call No.: DNAL 450 N42).

0458

### **Comparison of canopy position and other factors on seedling growth in *Acacia smallii*.**

TJSCA. Lohstroh, R.J. Van Auken, O.W. Lubbock, Tex. : Texas Academy of Science. *The Texas journal of science*. Aug 1987. v. 39 (3). p. 233-239. Includes references. (NAL Call No.: DNAL 470 T31).

0459

### **Comparison of nutrient losses by harvesting and site preparation practices in the Georgia Piedmont and Coastal Plain.**

Gaskin, J.W. Nutter, W.L.; McMullen, T.M. S.1. : Research Division, Georgia Forestry Commission. Georgia forest research paper. May 1989. (77). 8 p. ill. Includes references. (NAL Call No.: DNAL SD356.52.G4G4).

0460

### **Design efficiencies with planned and unplanned unbalance for estimating heritability in forestry.**

FOSCA. McCutchan, B.G. Namkoong, G.; Giesbrecht, F.G. Bethesda, Md. : Society of American Foresters. Design efficiencies are evaluated for the estimation of heritability in unbalanced designs using Modified Maximum Likelihood estimation. Assuming knowledge of the variance components, the variance of the estimate of heritability is calculated. The effects of block size, plot size, family size, variance of family size, and total number of observations on design efficiency are examined across the range of heritability and under 100%, 90%, 80%, and 60% survival. The implications of each of these design factors are discussed. There is no uniformly best design for estimating heritability; the most efficient design is a function of the heritability. *Forest science*. Sept 1989. v. 35 (3). p. 801-815. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0461

### **Development of an ectomycorrhizal inoculation procedure for micropropagated *Eucalyptus* plantlets.**

Malajczuk, N. Hartney, V.J. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 212. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0462

### **Development of Ectomycorrhizae on container-grown European larch.**

TPNA. Rietveld, W.J. Sharp, R.A.; Kienzler, M.F.; Dixon, R.K. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Spring 1989. v. 40 (2). p. 12-17. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0463

**Ectomycorrhizal fungi associated with *Pinus edulis* in the Piceance Basin of Colorado.**

MYXNAE. Acsai, J. Ithaca, N.Y. : Mycotaxon, Ltd. Mycotaxon. Apr/June 1989. v. 35 (1). p. 107-119. ill. Includes references. (NAL Call No.: DNAL QK603.2.M9).

0464

**Effect of a clay mineral (montmorillonite) on the nodulation of *Alnus* and on the nitrogenase activity of *Frankia* in pure culture.**

Smolander, A. Nurmiäho-Lassila, E.L.; Sundman, V. Philadelphia, Pa. : Balaban Publishers. Symbiosis. Paper presented at the "Symposium on Nitrogen Fixation and Symbiotic Systems," February 28-March 1, 1988, Jerusalem. 1988 v. 6 (1/2). p. 37-52. ill. Includes references. (NAL Call No.: DNAL QH548.S9).

0465

**Effect of acidification of calcareous soil on the proliferation of ectomycorrhizal *Carya illinoensis* roots.**

Riley, T.D. Taber, R.; Fenn, L.; Neck, J. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 351. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0466

**Effect of different mycorrhizal fungi on *Pinus radiata* seedling growth.**

Chu-Chou, M. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 208. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0467

**Effect of fertilizers and ectomycorrhizal inoculum on stunted Douglas firs.**

Hall, I.R. Garden, E. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 224. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0468

**Effect of glyphosate (Roundup formulation) on periphytic algal photosynthesis.**

BECTA6. Goldsborough, L.G. Brown, D.J. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Aug 1988. v. 41 (2). p. 253-260. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

0469

**Effect of slow release fertilizers on formation of mycorrhizae and growth of container grown pine seedlings.**

Crowley, D.E. Maronek, D.M.; Hendrix, J.W. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1986. v. 4 (3). p. 97-101. Includes 11 references. (NAL Call No.: DNAL SB1.J66).

0470

**Effect of various nutrient regimes and ectomycorrhizal inoculations on field survival and growth of *Ponderosa* pine (*Pinus ponderosa* var. *scopulorum* Engelm.) container seedlings in Arizona.**

TPLNA. Heidmann, L.J. Cornett, Z.J. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Spring 1986. v. 37 (2). p. 15-19. Includes 16 references. (NAL Call No.: DNAL 1.962 C5T71).

0471

**Effects and interactions of slash burning and mycorrhizal infection on douglas-fir seedling growth and morphology.**

Black, C.H. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 276. (NAL Call No.: DNAL aQK604.N6 1984).

0472

**Effects of atmospheric CO<sub>2</sub> enrichment on the growth and mineral nutrition of *Quercus alba* seedlings in nutrient-poor soil.**

PLPHA. Norby, R.J. D'Neill, E.G.; Luxmoore, R.J. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1986. v. 82 (1). p. 83-89. Includes 30 references. (NAL Call No.: DNAL 450 P692).



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0473

**Effects of different urea fertilizers on soil and trees in a young thinned stand of western hemlock.**

SSSJD4. Radwan, M.A. DeBell, D.S. Madison, Wis. : The Society. Effects of three different urea fertilizers on selected chemical characteristics of soils and foliage, and on growth per tree of a 24-yr-old thinned stand of western hemlock *Tsuga heterophylla* (Raf.) Sarg. were compared at a site in coastal Oregon. Treatments were the following: untreated control (C), urea (U), urea treated with N-Serve nitrapyrin, 2-chloro-6-(trichloromethyl) pyridine (U + NS), and sulfur-coated urea (SCU). Fertilizers were uniformly applied by hand to 0.03-ha plots in March at 224 kg N ha<sup>-1</sup>. Soil, to a depth of 20 cm, and current-year foliage were sampled periodically for 2 yr. Height and diameter of 10 dominant or codominant trees per plot were measured annually for 6 yr. Treatment effects on soil pH varied by fertilizer and sampling date; throughout, pH was lower with U + NS than with U, and the smallest change in pH was associated with SCU. Effects of fertilizer on inorganic N in the soil and on foliar nutrients varied by fertilizer and sampling date. Initially, N-Serve inhibited nitrification and produced the highest NH<sub>4</sub>-N concentrations. In general, all fertilizers increased inorganic N in the soil and total N in the foliage. Fertilizers significantly reduced foliar concentrations of some other macronutrients, especially in the first year after fertilization; some depressions were significantly less with SCU than with the other two fertilizers. Height growth per tree was not significantly affected by any of the fertilizers. Basal-area and volume growth per tree were significantly greater with the SCU treatment than with the control, U, or U + NS treatments. Beneficial effects of SCU seemed to be mostly due to the slow release of N from the fertilizer, although some positive effect of S cannot be ruled out. Soil Science Society of America journal. May/June 1989. v. 53 (3). p. 941-946. Includes references. (NAL Call No.: DNAL 56.9 S03).

0474

**Effects of different vesicular-arbuscular mycorrhizal fungi on growth of *Fraxinus americana* cultivated under field conditions.**

Furlan, V. Fortin, J.A.; Campagna, J.P. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 232. ill. (NAL Call No.: DNAL aQK604.N6 1984).

0475

**Effects of ectomycorrhiza on host growth and carbon balance in a semi-hydroponic cultivation system.**

NEPHA. Nylund, J.E. Wallander, H. New York, N.Y. : Cambridge University Press. The New phytologist. July 1989. v. 112 (3). p. 389-398. Includes references. (NAL Call No.: DNAL 450 N42).

0476

**Effects of fertilization and fungal strain on ectomycorrhizal development of Sitka spruce seedlings.**

Shaw, C.G. III. Jackson, R.M.; Thomas, G.W. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 217. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0477

**Effects of *Flomus fasciculatum* or *Glomus mosseae* on growth of *Liriodendron tulipifera* under high fertility.**

Verkade, S.D. Hamilton, D.F. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1985. v. 3 (3). p. 101-103. Includes 24 references. (NAL Call No.: DNAL SB1.J66).

0478

**Effects of flooding and nutrient enrichment on biomass allocation in *Acer rubrum* seedlings.**

AJBOA. Day, F.P. Jr. Baltimore, Md. : Botanical Society of America. American journal of botany. Oct 1987. v. 74 (10). p. 1541-1554. Includes references. (NAL Call No.: DNAL 450 AM36).

0479

**Effects of forest soil acidification on ectomycorrhizal and vesicular-arbuscular mycorrhizal development.**

NEPHA. Danielson, R.M. Visser, S. New York, N.Y. : Cambridge University Press. The New phytologist. May 1989. v. 112 (1). p. 41-47. Includes references. (NAL Call No.: DNAL 450 N42).

0480

**Effects of mycorrhizas and pH on nitrogen uptake by NW coniferous seedlings.**

Bledsoe, C.S. Rygiewicz, P.T. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 344. (NAL Call No.: DNAL aQK604.N6 1984).

0481

**Effects of O3 on alder photosynthesis and symbiosis with Frankia.**

NEPHA. Greitner, C.S. Winner, W.E. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1989. v. 111 (4). p. 647-656. ill. Includes references. (NAL Call No.: DNAL 450 N42).

0482

**Effects of propagation container dimensions, and media on the growth of 4 nursery crops.**

Threadgill, C.C. Whitcomb, C.E.; McNew, R. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1985. v. 3 (3). p. 126-131. Includes 12 references. (NAL Call No.: DNAL SB1.J66).

0483

**Effects of simulated acid rain on cadmium mobilization in soils and subsequent uptake and accumulation in poplar and sunflower.**

JOSHB. Gingas, V.M. Sydnor, T.D.; Weidensaul, T.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1988. v. 113 (2). p. 258-261. Includes references. (NAL Call No.: DNAL 81 S012).

0484

**Explorations of mechanisms regulating ectomycorrhizal colonizations sic of boron-fertilized pine quarterly report, period covered 8/20/86-3/31/87 /principal investigator, Harold E. Garrett.**

Garrett, Harold E. Columbia, Mo. : University of Missouri? , 1987. "Submitted to Department of Energy."~ "DOE/CE/15270--T1."~ "DE87 006451."~ "Instrument no. DE-FG01-86CE1570." 17 p. : ill. ; 28 cm. (NAL Call No.: DNAL QK918.G3).

0485

**Foliar nutrient composition of Juniperus osteosperma and environmental interactions.**

FOSCA. Bunderson, E.D. Weber, D.J. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1986. v. 32 (1). p. 149-156. maps. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0486

**Glutamine synthetase/glutamate synthase pathway for ammonium assimilation in beech ectomycorrhizas.**

Martin, F. Genetet, I.; Stewart, G. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 357. (NAL Call No.: DNAL aQK604.N6 1984).

0487

**Growth and nutrient status of black spruce seedlings as affected by water table depth.**

Czapowskyj, M.M. Rourke, R.V.; Grant, W.J. Broomall, Pa. : The Station. USDA Forest Service Research Paper NE-RP - Northeastern Forest Experiment Station. Aug 1986. (591). 9 p. Includes references. (NAL Call No.: DNAL A99.9 F7622UN).

0488

**Growth, xylem pressure potential, and nutrient absorption of loblolly pine on a reclaimed surface mine as affected by an induced Pisolithus tinctorius infection.**

FOSCA. Walker, R.F. West, D.C.; McLaughlin, S.B.; Amundsen, C.C. Bethesda, Md. : Society of American Foresters. The effects of Pisolithus tinctorius ectomycorrhizae on survival, growth, xylem pressure potential, and nutrient uptake of loblolly pine on a southern Appalachian coal surface mine were examined. One-year-old bareroot seedlings artificially inoculated with P. tinctorius and control seedlings with Thelephora terrestris ectomycorrhizae were outplanted on a surface-mined site in Tennessee. The site had previously been contoured and hydroseeded with a mixture of herbaceous ground cover species. A soil fertility variable was imposed in the study by broadcast fertilization at outplanting of one-half of the plots of each mycorrhizal treatment at the rate of 336 kg/ha NPK. After 7 years, survival and growth of trees previously inoculated with P. tinctorius were significantly improved relative to control trees. Fertilization elicited a significant reduction in survival and a negligible growth response in trees of both mycorrhizal treatments due primarily to its stimulation of competing herbaceous species. During the third



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growing season, xylem pressure potential of seedlings with *P. tinctorius* ectomycorrhizae was significantly less negative than that of control seedlings during a prolonged period of moisture stress. Analyses of foliar samples collected during the third growing season revealed that seedlings infected by *P. tinctorius* had more NO<sub>3</sub> and less Zn in their needles than control seedlings. The results of this study provide evidence that the benefits afforded loblolly pine on surface mines by *P. tinctorius* ectomycorrhizae include enhanced absorption of water as well as increased uptake of nutrients, and these benefits are not compromised by the presence of competing herbaceous species. *Forest science*. June 1989. v. 35 (2). p. 569-581. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0489

### **Herbicide conversion of a sand shinnery oak (*Quercus havardii*) community: effects on nitrogen.**

JRMGA. Sears, W.E. Britton, C.M.; Wester, D.B.; Pettit, R.D. Denver, Colo. : Society for Range Management. *Journal of range management*. Sept 1986. v. 39 (5). p. 403-407. Includes references. (NAL Call No.: DNAL 60.18 J82).

0490

### **Highly stocked coniferous stands on the Olympic Peninsula: chemical composition and implications for harvest strategy.**

XFPNA. Little, S.N. Waddell, D.R. Portland, Or. : The Station. USDA Forest Service research paper PNW-RP - United States, Pacific Northwest Research Station. Oct 1987. (384). 29 p. ill., maps. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

0491

### **Incompatibility factors and mating competence of two *Laccaria* spp. (Agaricales) associated with black spruce in northern Minnesota.**

PHYTA. Doudrick, R.L. Anderson, N.A. St. Paul, Minn. : American Phytopathological Society. Sporocarps of *Laccaria* were collected in conjunction with a survey of potential ectomycorrhizal fungi associated with black spruce in northern Minnesota. Homokaryons were grown from single spores, and dikaryons were isolated from sporocarp tissue and from surface-disinfested ectomycorrhizae. Pairings of sibling homokaryons indicated a bifactorial (tetrapolar) sexual incompatibility system for all sporocarps. In only six of 37 cases were 15-22 homokaryons insufficient to find the four mating-type factors from a single sporocarp. All pairings between homokaryons obtained from sporocarps collected on peatlands with those from mineral soils were negative. Sporocarps collected in black spruce stands on peatlands were members of a freely interbreeding population, *Laccaria laccata* var. *moelleri*. Sporocarps collected on mineral soils

represented several populations of *Laccaria bicolor*, with reduced outbreeding efficiency. The reduced outbreeding efficiency in *L. bicolor* (evident as a decrease in the number of clamp-connections produced in pairings of nonsibling sexually compatible homokaryons) apparently is due to a heterogenic incompatibility system, superimposed on the sexual incompatibility system. Preliminary evidence suggested a possible relationship between site-related factors for collections of *L. bicolor* identified by the survey and their mating competence. Di-mon pairings of *L. l. moelleri* and *L. bicolor* homokaryons with dikaryons isolated from black spruce ectomycorrhizae synthesized in aseptic culture indicated that precise genetic identification of the dikaryotic strains of both species was possible when known A and B mating-type factors were used as markers. *Phytopathology*. June 1989 v. 79 (6). p. 694-700. ill., maps. Includes references. (NAL Call No.: DNAL 464.8 P56).

0492

### **Influence of VA mycorrhiza on growth, nutrient absorption and water relations in *Leucaena leucocephala*.**

Huang, R.S. Smith, W.K.; Yost, R.S. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. *Proceedings of the 6th North American Conference on Mycorrhizae* : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 411. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0493

### **Interactions of fire with nutrients in the herbaceous layer of a nutrient-poor Coastal Plain forest.**

BTBCAL. Gilliam, F.S. Bronx, N.Y. : The Club. *The Bulletin of the Torrey Botanical Club*. Oct/Dec 1988. v. 115 (4). p. 265-271. Includes references. (NAL Call No.: DNAL 451 T63B).

0494

### **Interactions of nitrogen, phosphorus and mycorrhizae inoculation on nutrient content and growth of *Pinus contorta*.**

Rousseau, J. Reid, C.P.P. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. *Proceedings of the 6th North American Conference on Mycorrhizae* : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 340. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).



0495

**Microbial inoculants for tissue-cultured ectomycorrhizal and actinorrhizal trees.**

Loree, M. Stowers, M.; Garton, S.; Wood, T. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 66-68. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0496

**Mycorrhizae benefit plants under fertile conditions.**

ANURA. Verkade, S.D. Hamilton, D.F. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Dec 15, 1985. v. 162 (12). p. 67-71. Includes references. (NAL Call No.: DNAL 80 AM371).

0497

**Mycorrhizal formation on containerized seedlings in the Intermountain Region.**

Kidd, F. Breuer, D.; Miller, D. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 218. ill. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0498

**Mycorrhizal growth enhancement in Sitka spruce seedlings differs in nonsterile compared to sterilized soil.**

Walker, C. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 213. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0499

**Mycorrhizal responsiveness of four cedar and redwood species of western North America.**

Kough, J.L. Molina, R.; Linderman, R.G. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p.

259. (NAL Call No.: DNAL aQK604.N6 1984).

0500

**Natural mycorrhizal colonization of pines on reclaimed surface mines in Virginia.**

JEVQAA. Schoenholtz, S.H. Burger, J.A.; Torbert, J.L. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Apr/June 1987. v. 16 (2). p. 143-146. Includes references. (NAL Call No.: DNAL QH540.J6).

0501

**Nitrogen fertilisation and ectomycorrhizal formation of Pinus caribaea (Morelet) seedlings.**

Amakiri, M.A. Ojobo, L.I. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 339. ill. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0502

**Nitrogen isotope fractionation in burned and unburned chaparral soils.**

SSSJD4. Herman, D.J. Rundel, P.W. Madison, Wis. : The Society. Plant and soil processes involving N-transformations have been monitored by techniques measuring the  $^{15}\text{N}/^{14}\text{N}$  ratio in a sample relative to the atmosphere ( $\delta^{15}\text{N}$ ). Usually low  $\delta^{15}\text{N}$  values have been reported in the tissues of chaparral shrubs. The primary objective of this study was to investigate soil N-cycling processes which may yield the low plant tissue  $\delta^{15}\text{N}$  levels. Since the chaparral is subject to periodic brush fires, which in turn result in high levels of inorganic N-forms in the soil during the first year following the burn, possible effects of burning on soil  $\delta^{15}\text{N}$  were also investigated. Incubations were conducted on soils from an area which had been subjected to a brush fire, and an adjacent unburned area; both soils are fine, thermic, schistose, very steep Ultic Haploxeralfs. Concentrations and  $\delta^{15}\text{N}$  of soil  $\text{NH}_4(1+)$  and  $\text{NO}_3(-1)$  were periodically measured. A C- and N-rich ash resulted in rapid mineralization of N in the burned soil; a substrate more resistant to biological degradation resulted in an initial loss, then subsequent slow accumulation of inorganic-N in the unburned soil. Nitrate was the dominant mineral species in each soil after a few weeks. As nitrification progressed,  $\delta^{15}\text{N}$  of  $\text{NH}_4(1+)$  increased and  $\delta^{15}\text{N}$  of  $\text{NO}_3(-1)$  decreased. Since the mineral pool in each soil became dominated by  $\text{NO}_3(-1)$   $\delta^{15}\text{N}$  of the mineral pool became strongly negative. A mathematical model of isotope dynamics fits empirical data well. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1229-1236. Includes references. (NAL Call No.:



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DNAL 56.9 S03).

0503

**Nitrogen losses from diazotrophic lichens.**  
Millbank, J.W. New York : Plenum Press, c1985.  
Lichen physiology and cell biology / edited by  
D.H. Brown. Literature review. p. 161-172.  
Includes references. (NAL Call No.: DNAL  
QK581.L49).

0504

**Nitrogen sources and fertilizer rates affect growth of hybrid poplar.**  
Hansen, E.A. Tolsted, D.N. Urbana-Champaign :  
Dept. of Forestry, University of Illinois,  
1985. Fifth Central Hardwood Forest Conference  
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University of Illinois at Urbana-Champaign,  
Illinois, April 15-17, 1985 / edited by Jeffrey  
D. Dawson and Kimberly A. Majerus. p. 71-77.  
Includes references. (NAL Call No.: DNAL  
SD397.H3C46 1985).

0505

**Nutrient concentration effects on *Pisolithus tinctorius* development on containerized loblolly pine (*Pinus taeda* L.) seedlings.**  
TPLNA. Torbert, J.L. Burger, J.A.; Kreh, R.E.  
Washington, D.C. : The Service. Tree planters'  
notes - U.S. Department of Agriculture, Forest  
Service. Summer 1986. v. 37 (3). p. 17-22.  
Includes references. (NAL Call No.: DNAL 1.962  
C5T71).

0506

**Performance of ectomycorrhizal Sitka spruce seedlings outplanted in SE Alaska.**  
Shaw, C.G. III. Sidle, R.C. Corvallis, Or. :  
Oregon State University, Forest Research  
Laboratory, 1985. Proceedings of the 6th North  
American Conference on Mycorrhizae : June  
25-29, 1984, Bend, Oregon / compiled and edited  
by Randy Molina ; sponsoring institutions,  
Oregon State University, College of Forestry,  
and USDA. p. 216. Includes references. (NAL  
Call No.: DNAL aQK604.N6 1984).

0507

**Performance of *Miconia albicans* (Sw.) triana, an aluminum-accumulating species, in acidic and calcareous soils.**  
CSOSA2. Haridasan, M. New York, N.Y. : Marcel  
Dekker. Communications in soil science and  
plant analysis. May/Sept 1988. v. 19 (7/12). p.  
1091-1103. Includes references. (NAL Call No.:  
DNAL S590.C63).

0508

**Predicting fertilizer response of loblolly pine using foliar and needle-fall nutrients sampled in different seasons.**  
FOSCA. McNeil, R.C. Lea, R.; Ballard, R.;  
Allen, H.L. Bethesda, Md. : Society of American  
Foresters. Nitrogen (N) phosphorus (P)  
concentrations in loblolly pine (*Pinus taeda*)  
foliage and needle-fall were determined five  
times during 1979 on ten fertilizer trails  
installed between 1971 and 1973. Bole volume  
responses to fertilizers were regressed on  
initial stand basal area, and the residual  
errors were used as dependent variables in  
regressions with the nutrient variables. The  
only sampling period during which the N  
response residuals had a significant relation  
to foliar nutrients was early fall. The  
needle-fall N/P ratio was significantly related  
to the N response residuals in late winter,  
late spring, and early fall. Phosphorus  
response residuals were significantly related  
to foliar nutrients during all sampling periods  
and to needle-fall N/P in all sampling periods  
except late winter. The maximum R<sup>2</sup>, 0.73, was  
for the regression of the P response residuals  
versus a foliar N/P ratio in late spring. The N  
+ P response residuals were not significantly  
related to foliar or needle-fall nutrients.  
For. Sci. 34(3):698-707. Forest science. Sept  
1988. p. 698-707. Includes references. (NAL  
Call No.: DNAL 99.8 F7632).

0509

**The role of elicitors in ectomycorrhizal formation.**  
Coleman, M.E. Anderson, A.J. Corvallis, Or. :  
Oregon State University, Forest Research  
Laboratory, 1985. Proceedings of the 6th North  
American Conference on Mycorrhizae : June  
25-29, 1984, Bend, Oregon / compiled and edited  
by Randy Molina ; sponsoring institutions,  
Oregon State University, College of Forestry,  
and USDA. p. 361-362. Includes references. (NAL  
Call No.: DNAL aQK604.N6 1984).

0510

**The role of proteins in the nitrogen nutrition of ectomycorrhizal plants. V. Nitrogen transfer in birch (*Betula pendula*) grown in association with mycorrhizal and non-mycorrhizal fungi.**  
NEPHA. Abuzinadah, R.A. Read, D.J. New York,  
N.Y. : Cambridge University Press. The New  
phytologist. May 1989. v. 112 (1). p. 61-68.  
Includes references. (NAL Call No.: DNAL 450  
N42).

0511

**The role of proteins in the nitrogen nutrition of ectomycorrhizal plants. IV. The utilization of peptides by birch (*Betula pendula* L.) infected with different mycorrhizal fungi.**  
NEPHA. Abuzinadah, R.A. Read, D.J. New York,  
N.Y. : Cambridge University Press. The New

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phytologist. May 1989. v. 112 (1). p. 55-60. ill. Includes references. (NAL Call No.: DNAL 450 N42).

0512

**Root and foliar nutrient concentrations in loblolly pine: effects of season, site, and fertilization.**

FOSCA. Adams, M.B. Campbell, R.G.; Allen, H.L.; Davey, C.B. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1987. v. 33 (4). p. 984-996. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0513

**Root morphology of inoculated, container-grown pine seedlings influences spread of *Pisolithus* to egressed roots after planting.**

Ruehle, J.L. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 215. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0514

**Rubidium transfer rates and storage in mycorrhizal coniferous roots.**

Rygiewicz, P.T. Bledsoe, C.S. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 345. (NAL Call No.: DNAL aQK604.N6 1984).

0515

**Seasonal changes in nitrogen fixation activity of European black alder and Russian olive.**

XFGTA. Zitzer, S.F. Dawson, J.D.; Gertner, G.Z. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 134-140. Includes 70 references. (NAL Call No.: DNAL aSD11.A352).

0516

**Seedling growth and mineral nutrition of Scots pine under acidic to calcareous soil conditions.**

SOSCAK. Carter, M.R. Baltimore, Md. : Williams & Wilkins. Soil science. Sept 1987. v. 144 (3). p. 175-180. Includes references. (NAL Call No.: DNAL 56.8 S03).

0517

**Some studies on *Pisolithus tinctorius* in vitro and in vivo as influences by captan and brassicol (PCNB).**

Bhattacharyya, A.K. Narayanan, R. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 366. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0518

**Sporulation of *Endogone pisiformis* in pure culture.**

Berch, S.M. Castellano, M.A. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 426. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0519

**The symbiosis *Rhizobium-glomus* in *Leucaena leucocephala*.**

Guzman-Plazola, R.A. Ferrera-Cerrato, R.; Etchevers, J.D.; Corona, T. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 237. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0520

**Techniques for determining seedling water status and their effectiveness in assessing stress.**

Joly, R.J. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. p. 17-28. ill. Includes references. (NAL Call



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No. : DNAL SD404.E93).

0521

**Triadimefon and Pisolithus ectomycorrhizae  
affect second-year field performance of  
loblolly pine.**

Marx, D.H. Asheville, N.C. : The Station.  
Research note SE - USDA Forest Service,  
Southeastern Forest Experiment Station. Dec  
1987. (349). 6 p. Includes references. (NAL  
Call No.: DNAL aSD12.A13R47).

# PLANT PHYSIOLOGY AND BIOCHEMISTRY

0522

**Acclimation and low-temperature tolerance of eight woody taxa.**

HJHSA. Lindstrom, D.M. Dirr, M.A. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1989. v. 24 (5). p. 818-820. Includes references. (NAL Call No.: DNAL SB1.H6).

0523

**Acidic deposition and tree growth. I. The use of stem analysis to study historical growth patterns.**

JEVQAA. LeBlanc, D.C. Raynal, D.J.; White, E.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1987. v. 16 (4). p. 325-333. Includes references. (NAL Call No.: DNAL QH540.J6).

0524

**Acidic deposition and tree growth. II. Assessing the role of climate in recent growth declines.**

JEVQAA. LeBlanc, D.C. Raynal, D.J.; White, E.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1987. v. 16 (4). p. 334-340. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Action of 6-benzylamino purine and indole-3-butyric acid on development of immature embryos of *Populus deltoides* Bartr.**

Savka, M.A. Jokela, J.J.; Skirvin, R.M.; Dawson, J.O. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 140-148. ill. Includes references. (NAL Call No.: DNAL SD399.5.N6).

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**Adaptability of black walnut, black cherry, and northern red oak to northern California.**

TPLNA. McDonald, P.M. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1987. v. 38 (4). p. 31-36. ill. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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**All in good time.**

ANURA. Smith, S.L. Chicago, Ill. : American Nurseryman Publishing Company. American nurseryman. Second of a series. Dec 15, 1989. v. 170 (12). p. 61-63. (NAL Call No.: DNAL 80 AM371).

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**Allelochemical resistance of bald cypress, *Taxodium distichum*, Heartwood to the Subterranean termite, *Coptotermes formosanus*.** JCECD. Scheffrahn, R.H. Hsu, R.C.; Su, N.Y.; Huffman, J.B.; Midland, S.L.; Sims, J.J. New York, N.Y. : Plenum Press. Journal of chemical ecology. Mar 1988. v. 14 (3). p. 765-776. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0529

**Allelopathy: chemical interactions between plants.**

ANURA. Boes, T.K. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Jan 15, 1986. v. 163 (2). p. 67-72. Includes references. (NAL Call No.: DNAL 80 AM371).

0530

**Alteration of cell-wall water content and elasticity in Douglas-fir during periods of water deficit.**

PLPHA. Joly, R.J. Zaerr, J.B. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Feb 1987. v. 83 (2). p. 418-422. Includes references. (NAL Call No.: DNAL 450 P692).

0531

**Altitudinal variation in nitrogenase activity of the Himalayan alder naturally regenerating on landslide-affected sites.**

NEPHA. Sharma, E. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 411-416. Includes references. (NAL Call No.: DNAL 450 N42).

0532

**Aluminum in foliage and bark of Black Alder, Eastern Cottonwood, and White Basswood.**

IFRRA. David, M.B. Cote, B.; Vance, G.F. Urbana, Ill. : The Station. Forestry research report - Agricultural Experiment Station, University of Illinois. Aug 1988. (88-7) AGL. 6 p. Includes references. (NAL Call No.: DNAL SD12.I3I4).

0533

**Analysis of forest fertilizer experiments: obtaining better precision and extracting more information.**

FDSCA. Woollons, R.C. Whyte, A.G.D. Bethesda, Md. : Society of American Foresters. Later-age forest fertilizer experiments can be quite difficult to analyze appropriately and in ways that extract all the information inherent in the collected data. Observed responses are



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likely to be partially confounded with variations in pretreatment stand development, most of which can be removed through analyses of covariance using quanta of initial growing stock as a covariate. Pretreatment growth rate may represent an even more discerning covariate. Rather than use covariance some authors have chosen, instead, to use arithmetical procedures to adjust treatment responses. Reanalysis of a Canadian experiment of this latter kind suggests that such methodology may be less than ideal, and should not be preferred to covariance analysis. A general and systematic procedure for examining forest nutrition experiments is proposed for those involving  $t$  treatments, and also those where the  $t$  treatments represent  $n$  factors at  $p$  levels in factorial combination. An example of adopting the recommendation methodology for the first type is given using a completely randomized experiment in naturally regenerated radiata pine in New Zealand with five replications of four treatments. Adoption of the suggested procedures in conjunction with two covariates provides a useful insight into the data, and appreciably increases precision. The system is sequential in structure, necessarily inducing some risk of erroneous hypothesis testing. Such a danger is usually minimal, however, and the suggested system, it is claimed, represents a useful method for isolating treatment and growth effects in forest fertilizer trials. *For. Sci.* 34(3):769-780. Forest science. Sept 1988. p. 769-780. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0534

**Analysis of the  $3/2$  power law of self-thinning.**  
FOSCA. Zeide, B. Bethesda, Md. : Society of American Foresters. Forest science. June 1987. v. 33 (2). p. 517-537. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Anatomical changes and peroxidase activity after cytokinin treatments inducing adventitious bud formation on embryos of *Picea abies*.**

BOGAA. Arnold, S. von. Gronroos, R. Chicago, Ill. : University of Chicago Press. Botanical gazette. Dec 1986. v. 147 (4). p. 425-431. ill. Includes references. (NAL Call No.: DNAL 450 B652).

0536

**Anatomy and physiology related to chemical movement in trees.**

JOARD. Chaney, W.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1986. v. 12 (4). p. 85-91. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Apical control of compression wood action in white pine branches.**

WOSTBE. Wilson, B.F. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1986. v. 20 (2). p. 111-117. Includes references. (NAL Call No.: DNAL SD433.A1W6).

0538

**Application of an evapotranspiration model to estimating understory removal effects in a douglas-fir forest.**

Kelliher, F.M. Black, T.A. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 259-262. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

0539

**Applications of biotechnology in forest tree improvement.**

Hanover, J.W. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 59-70. ill. (NAL Call No.: DNAL A99.9 F769).

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**Applied plant growth models for grazinglands, forests, and crops.**

Joyce, L.A. Kickert, R.N. Boca Raton, Fla. : CRC Press, 1987. Plant growth modeling for resource management / editors, Karin Wisiol, J.D. Hesketh. Literature review. v. 1 p. 17-55. Includes references. (NAL Call No.: DNAL QK731.P593).

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**Asexual propagation of selected Monterey pine Christmas trees for chlorosis resistance of alkaline sites.**

Ruter, J.M. Van de Werken, H. Boulder, Colo. : International Plant Propagators' Society. The Plant propagator. Dec 1986. v. 32 (4). p. 10-14. Includes references. (NAL Call No.: DNAL 81 P692).

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**Aspects of cone and ovule ontogeny in *Cryptomeria* (Taxodiaceae).**

AJBOAA. Takaso, T. Tomlinson, P.B. Columbus, Ohio : Botanical Society of America. American journal of botany. May 1989. v. 76 (5). p. 692-705. ill. Includes references. (NAL Call

No.: DNAL 450 AM36).

0543

**Astringency of Douglas-fir foliage in relation to phenology and xylem pressure potential.**

JCECD. Horner, J.D. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1988. v. 14 (4). p. 1227-1237. Includes references. (NAL Call No.: DNAL QD415.A1J6).

0544

**Atmospheric deposition effects on loblolly pine: development of an intensive field research site.**

Chappelka, A.H. Lockaby, B.G.; Meldahl, R.S.; Kush, J.S. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 57-60. Includes references. (NAL Call No.: DNAL aSD11.U57).

0545

**Basidiospores of Rhizopogon vinicolor and Rhizopogon colossus as ectomycorrhizal inoculum.**

Castellano, M.A. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 211. (NAL Call No.: DNAL aQK604.N6 1984).

0546

**Behind the decline.**

JFUSA. Sheffield, R.M. Cost, N.D. Bethesda, Md. : Society of American Foresters. Journal of forestry. Jan 1987. v. 85 (1). p. 29-33. ill., maps. Includes references. (NAL Call No.: DNAL 99.8 F768).

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**Biochemical and physiological adaptations of plant cells to acid environments.**

Levandowsky, M. Boulder, Colo. : Westview Press, 1987. Atlantic white cedar wetlands / edited by Aimlee D. Laderman. Paper presented at the First Atlantic White Cedar Wetlands Symposium, held at the Marine Biological Laboratory, Woods Hole, Massachusetts, October, 1984.~ Literature review. p. 241-253. Includes references. (NAL Call No.: DNAL QK938.M3A8).

0548

**Biochemical diversity of ponderosa pine and predation by bark beetles (Coleoptera: Scolytidae).**

JEENAI. Sturgeon, K.B. Mitton, J.B. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1986. v. 79 (4). p. 1064-1068. Includes references. (NAL Call No.: DNAL 421 J822).

0549

**Biological inference from growth-climate correlations in balsam poplar in Alaska.**

Lev, D.J. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 80-89. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**Biotechnology of somatic polyembryogenesis and plantlet regeneration in loblolly pine.**

Gupta, P.K. Durzan, D.J. New York, N.Y. : Nature Pub. Co. Bio/technology. Feb 1987. v. 5 (2). p. 147-151. ill. Includes references. (NAL Call No.: DNAL QH442.B5).

0551

**Blackout and post planting bud phenology in S X S spruce seedlings.**

Hawkins, C.D.B. Hooze, B.D. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 54-56. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Boron and ectomycorrhizal influences on IAA and IAA oxidase activity.**

Mitchell, R.J. Atalay, A.; Cox, G.S.; Garrett, H.E. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 338. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).



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**Bud dormancy.**

Lavender, D.P. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. Literature review. p. 7-15. Includes references. (NAL Call No.: DNAL SD404.E93).

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**Budbreak for twenty-three upland hardwoods compared under forest canopies and in recent clearcuts.**

FOSCA. McGee, C.E. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 924-935. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0555

**Buffer capacities of leaves, leaf cells, and leaf cell organelles in relation to fluxes of potentially acidic gases.**

PLPHA. Pfanz, H. Heber, U. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. June 1986. v. 81 (2). p. 597-602. Includes 38 references. (NAL Call No.: DNAL 450 P692).

0556

**Canopy conductance of coniferous forests related to climate.**

WRERA. Lindroth, A. Washington, D.C. : American Geophysical Union. Water resources research. Mar 1985. v. 21 (3). p. 297-304. Includes references. (NAL Call No.: DNAL 292.8 W295).

0557

**Carbohydrate concentration in pineas affected by inoculation with *Bursaphelenchus xylophilus*.**

JONEB. Bolla, R.I. Fitzsimmons, K.; Winter, R.E.K. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Jan 1987. v. 19 (1). p. 51-57. Includes references. (NAL Call No.: DNAL QL391.N4J62).

0558

**Carbohydrate status as a measure of seedling quality.**

Marshall, J.D. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. Literature review. p. 49-58. ill. Includes references. (NAL Call No.: DNAL SD404.E93).

0559

**Carbon dynamics of Northern hardwood forests gas exchange characteristics / Thomas W. Jurik, George M. Briggs and David M. Gates.**

Jurik, Thomas W. Briggs, George M.; Gates David Murray, 1921-. Washington, D.C. : U.S. Dept. of Energy, Office of Energy Research, Office of Basic Energy Sciences, Carbon Dioxide Division ; Springfield, Va. : Available from the National Technical Information Service, U.S. Dept. of Commerce, 1985 . "DOE/EV/10091-1."~ "Under contract no. DE-AC02-79EV10091."~ "TRD19."~ "February 1985." 70 p. : ill. ; 28 cm. Bibliography: p. 60-61. (NAL Call No.: DNAL SD397.H3J87).

0560

**Carbon metabolism in scions of Colorado blue spruce. I. Needle starch.**

JOSHB. Beeson, R.C. Jr. Proebsting, W.M. Alexandria, Va. : The Society. Needle starch metabolism was studied during graft development of Colorado blue spruce (*Picea pungens* Englemann 'Hoopsi') scions on Norway spruce *Picea abies* (L.) Karst rootstocks. Starch accumulated during the initial stages of union formation, but the rate of accumulation slowed over time. Peak starch content in developing greenhouse grafts was approximately 30% and, in lath house grafts, approximately 50% of that in 3-year-old grafts forced in the greenhouse. Prior to budbreak, starch content declined rapidly, stabilizing at pre-grafting levels during shoot elongation. Grafts with misaligned unions accumulated starch during the first week, but the starch content then declined. Preventing photosynthesis in scions during unionformation prevented starch accumulation, but did not affect graft success or subsequent scion growth. We concluded that neither starch accumulation nor current photosynthesis in the scion were required during union development. Journal of the American Society for Horticultural Science. Sept 1988. v. 113 (5). p. 796-799. Includes references. (NAL Call No.: DNAL 81 S012).

0561

**Carbon metabolism in scions of Colorado blue spruce. II. Carbon storage compounds.**

JOSHB. Beeson, R.C. Jr. Proebsting, W.M. Alexandria, Va. : The Society. The study evaluated the roles of storage carbohydrates and neutral lipids in the success of Colorado blue spruce (*Picea pungens* Englemann 'Hoopsi') grafts. These scions do not require photosynthesis nor receive photosynthates from the rootstock during union development. Carbohydrate and neutral lipid contents, along with respiration and scion water relations, were measured during union development. Stored carbon compounds were sufficient to supply the needs of the scion during the 9 weeks of union development. Estimates of carbohydrate use indicated that decreases in sugar content (bark and needle) were insufficient to account for more than 25% of the estimated respiration. The

results indicate that the quantity of carbon storage compounds is not a factor in graft success. We propose that neutral lipids may be the major carbon reserve of the scion during graft formation. *Journal of the American Society for Horticultural Science*. Sept 1988. v. 113 (5). p. 800-805. Includes references. (NAL Call No.: DNAL 81 SD12).

0562

**Carbon-13/carbon-12 variations in bristlecone pine over the past 600 years and their relation to climate and global atmospheric CO<sub>2</sub>.**

Long, A. Leavitt, S.W.; Cheng, S. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 485-493. Includes references. (NAL Call No.: DNAL QK477.2.A615 1986).

0563

**Catkin growth, seed production, and development of seed germinability in quaking aspen in central Alberta.**

TPLNA. Brown, K.R. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Spring 1989. v. 40 (2). p. 25-29. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0564

**Causes of mortality in outplanted ponderosa pine container seedlings in the Southwest.**

TPLNA. Heidmann, L.J. Haase, S.M. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1989. v. 40 (3). p. 16-19. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0565

**'Cedar' Palmer penstemon: a selected penstemon for semiarid ranges.**

Stevens, R. Monsen, S.B. Denver, Colo. : Society for Range Management. Rangelands. Aug 1988. v. 10 (4). p. 163-164. ill., maps. (NAL Call No.: DNAL SF85.A1R32).

0566

**Cellular drought tolerance studies in loblolly pine.**

Newton, R.J. Puryear, J.D.; Sen, S. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 71-78. Includes references. (NAL Call No.: DNAL A99.9 F769).

0567

**Changes in levels of foliar minerals and phenolics in trembling aspen, *Populus tremuloides*, in response to artificial defoliation.**

Mattson, W.U. Palmer, S.R. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William U. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 157-169. Includes references. (NAL Call No.: DNAL SB761.M46).

0568

**Changes in net primary productivity and cellulose decomposition rates in a water tupelo - bald cypress swamp following timber harvest.**

Mader, S.F. Aust, W.M.; Lea, R. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 539-543. Includes references. (NAL Call No.: DNAL aSD11.U57).

0569

**Changes in pattern of stem growth in pole-sized loblolly pine after sewage sludge application.**

McKee, W.H. Jr. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 461-463. Includes references. (NAL Call No.: DNAL aSD11.U57).

0570

**Changes in the ultrastructure of xylem parenchyma cells of peach (*Prunus persica*) and red oak (*Quercus rubra*) in response to a freezing stress.**

AJBOA. Wisniewski, M.E. Ashworth, E.N. Baltimore, Md. : Botanical Society of America. American journal of botany. Sept 1985. v. 72 (9). p. 1364-1376. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0571

**Characteristics of viscin from the seeds of dwarf mistletoe.**

BOGAA. Paquet, P.J. Knutson, D.M.; Tinnin, R.O.; Tocher, R.D. Chicago, Ill. : University of Chicago Press. Botanical gazette. June 1986. v. 147 (2). p. 156-158. Includes references. (NAL Call No.: DNAL 450 B652).



0572

**Characterization of an extracellular lignin peroxidase of the lignocellulolytic actinomycete *Streptomyces viridosporus*.**

APMBA. Ramachandra, M. Crawford, D.L.; Hertel, G. Washington, D.C. : American Society for Microbiology. Previously we reported production of an extracellular lignin-inducible peroxidase by *Streptomyces viridosporus* (M. Ramachandra, D. L. Crawford, and A. L. Pometto III, Appl. Environ. Microbiol. 53:2754-2760, 1987). This peroxidase was shown to oxidize 3,4-dihydroxyphenylalanine, 2,4-dichlorophenol, homoprotocatechuic acid, caffeic acid, and N,N,N',N'-tetramethylphenylenediamine and was found in higher than normal levels in strains enhanced for lignocellulose degradation. In the present study, we used a pure extracellular enzyme preparation with high peroxidase isoform P3 activity to oxidize lignin substructure model compounds of both the 1,2-diaryl propane and arylglycerol-beta-aryl ether types and containing C alpha-carbonyl and C alpha-hydroxyl groups. The reactions were monitored by gas chromatography-mass spectrometry and high-pressure liquid chromatography techniques. In the presence, but not the absence, of hydrogen peroxide, the enzyme preparation catalyzed C alpha-C beta bond cleavage in the side chains of the diaryl ethers 1-(3,4-dimethoxyphenyl)-2-(2-methoxyphenoxy)propane-1,3-diol (I) and 1-(4-hydroxy-3-methoxyphenyl)-2-(2-methoxyphenoxy)propan-1-one (II) and the diaryl ethane 1-(4-methoxyphenyl)-2-(phenyl)ethan-1-one (III). Rapid hydrogen peroxide consumption was observed when the enzyme preparation was added to either milled corn lignin or lignocellulose. Additional characterizations showed that this enzyme is a heme protein (Soret band, 408 nm) and a major component of the ligninolytic system of *S. viridosporus* T7A. This is the first report of a lignin peroxidase in a bacterium. We have designated this new lignin peroxidase as ALiP-P3. Applied and environmental microbiology. Dec 1988. v. 54 (12). p. 3057-3063. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

0573

**Characterization of historical growth patterns in declining red spruce trees.**

LeBlanc, D.C. Raynal, D.J.; White, E.H.; Ketchledge, E.H. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 360-371. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

0574

**Characterization of leucine auxotrophs of the white rot basidiomycete *Phanerochaete chrysosporium*.**

APMBA. Moiskness, T.A. Alic, M.; Gold, M.H. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. June 1986. v. 51 (6). p. 1170-1173. ill. Includes 26 references. (NAL Call No.: DNAL 448.3 AP5).

0575

**Characterization of sucrolysis via the uridine diphosphate and pyrophosphate-dependent sucrose synthase pathway.**

PLPHA. Xu, D.P. Sung, S.J.S.; Loboda, T.; Kormanik, P.P.; Black, C.C. Rockville, Md. : American Society of Plant Physiologists. The breakdown of sucrose to feed both hexoses into glycolytic carbon flow can occur by the sucrose synthase pathway. This uridine diphosphate (UDP) and pyrophosphate (PPi)-dependent pathway was biochemically characterized using soluble extracts from several plants. The sucrolysis process required the simultaneous presence of sucrose, UDP, and PPi with their respective Km values being about 40 millimolar, 23 micromolar, and 29 micromolar. UDP was the only active nucleotide diphosphate. Slightly alkaline pH optima were observed for sucrose breakdown either to glucose 1-phosphate or to triose phosphate. Sucrolysis increased with increasing temperature to near 50 degrees C and then a sharp drop occurred between 55 and 60 degrees C. The breakdown of sucrose to triose-P was activated by fructose 2,6-P2 which had a Km value near 0.2 micromolar. The cytoplasmic phosphofructokinase and fructokinase in plants were fairly nonselective for nucleotide triphosphates (NTP) but glucokinase definitely favored ATP. A predicted stoichiometric relationship of unity for UDP and PPi was measured when one also measured competing UDPase and pyrophosphatase activity. The cycling of uridylates, UDP to UTP to UDP, was demonstrated both with phosphofructokinase and with fructokinase. Enzyme activity measurements indicated that the sucrose synthase pathway has a major role in plant sucrose sink tissues. In the cytoplasmic sucrose synthase breakdown pathway, a role for the PPi-phosphofructokinase was to produce PPi while a role for the NTP-phosphofructokinase and for the fructokinase was to produce UDP. Plant physiology. June 1989. v. 90 (2). p. 635-642. Includes references. (NAL Call No.: DNAL 450 P692).

0576

**Charred wood stimulated germination of two fire-following herbs of the California chaparral and the role of Hemicellulose.**

AJB0A. Keeley, S.C. Pizzorno, M. Baltimore, Md. : Botanical Society of America. American journal of botany. Sept 1986. v. 73 (9). p. 1289-1297. Includes references. (NAL Call No.: DNAL 450 AM36).

0577

**Chemical variation in lodgepole pine with latitude, elevation, and diameter class.**  
 FPJDA. Kim, W.J. Campbell, A.G.; Koch, P. Madison, Wis. : Forest Products Research Society. Lodgepole pine (*Pinus contorta* var. *latifolia* and *murrayana*) is one of the most abundant and underutilized forest resources in the Northwest United States and Canada. This paper describes the chemical variation in lodgepole pine over its geographical range. The sample trees were collected from nine different latitudes (40 degrees to 60 degrees north), three elevations (low, medium, and high), and three diameter classes (76, 152, and 228 mm DBH). The average chemical composition of the *latifolia* stems was 0.26 percent ash, 2.87 percent extractives, 25.81 percent lignin, 80.40 percent holocellulose, and 49.64 percent alpha-cellulose. The average pH was 4.57. Ash, lignin, and holocellulose were negatively correlated with latitude, while alpha-cellulose generally increased as latitude increased. The extractive content was positively correlated with latitude. The ash content and pH were negatively correlated with diameter class, while extractive content was positively correlated with diameter class. The *latifolia* and *murrayana* trees had similar chemical characteristics and no extreme chemical variabilities that would limit ordinary wood utilization. Forest products journal. Mar 1989. v. 39 (3). p. 7-12. maps. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

0578

**Chlorophyll a fluorescence and photosynthetic and growth responses of *Pinus radiata* to phosphorus deficiency, drought stress, and high CO<sub>2</sub>.**  
 PLPHA. Conroy, J.P. Smillie, R.M.; Koppers, M.; Bevege, D.I.; Barlow, E.W. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. June 1986. v. 81 (2). p. 423-429. Includes 25 references. (NAL Call No.: DNAL 450 P692).

0579

**Chronic herbivory: impacts on architecture and sex expression of pinyon pine.**  
 SCIEA. Whitman, T.G. Mopper, S. Washington, D.C. : American Association for the Advancement of Science. Science. May 31, 1985. v. 228 (4703). p. 1089-1091. ill. Includes 23 references. (NAL Call No.: DNAL 470 SCI2).

0580

**Climate and red spruce growth and decline in the northern Appalachians.**  
 PNASA. Johnson, A.H. Cook, E.R.; Siccama, T.G. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Aug 1988. v. 85 (15). p. 5369-5373. Includes references. (NAL Call No.:

DNAL 500 N21P).

0581

**Clonal diversity in populations of *Polysphondylium pallidum*, a cellular slime mold.**  
 ECOLA. Ketcham, R.B. Eisenberg, R.M. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Oct 1989. v. 70 (5). p. 1425-1433. Includes references. (NAL Call No.: DNAL 410 EC7).

0582

**Cold-hardiness testing of conifer seedlings.**  
 Burr, K.E. Wallner, S.J.; Tinus, R.W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 104-108. Includes references. (NAL Call No.: DNAL aSD11.A42).

0583

**Cold tolerance of shade tree species and cultivars in the upper Midwest.**  
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0590

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0625

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0628

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HUJSA. Whitlow, T.H. Bassuk, N.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Woody Plants in the Urban Environment: Selection and Management of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 15, 1986, Davis, California. ~ Literature review. June 1988. v. 23 (3). p. 542-546. Includes references. (NAL Call No.: DNAL SB1.H6).

0629

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TPLNA. Bassman, J.H. Black, R.A.; Wang, X.Q. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1989. v. 40 (3). p. 13-15. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0631

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0632

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JOSHB. Smalley, T.J. Dirr, M.A.; Dull, G.G. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. May 1987. v. 112 (3). p. 459-463. Includes references. (NAL Call No.: DNAL 81 SD12).

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0634

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0635

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0636

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0637

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0638

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0639

**Effect of salinity on leaf ionic content and photosynthesis of Taxodium distichum L.**  
 AMNAA. Pezeshki, S.R. DeLaune, R.D.; Patrick, W.H. Jr. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1988. v. 119 (1). p. 185-192. Includes references. (NAL Call No.: DNAL 410 M58).

0640

**Effect of simulated insect damage on growth and survival of northern red oak (Quercus rubra L.) seedlings.**

EVETEX. Wright, S.L. Hall, R.W.; Peacock, J.W. Lanham, Md. : Entomological Society of America. Effects of simulated insect damage--artificial defoliation and root damage in combination with two levels of watering--were studied to determine the potential effect on northern red oak seedlings (Quercus rubra L.). Treatments and treatment combinations caused significant differences in stem diameter, percentage of stem dieback, and mortality. Defoliation and a regime of decreased watering seemed to have the greatest effect on seedling growth and mortality. Root injury had no consistent direct effect, but interacted significantly with other factors. Insect damage to foliage and roots, together with water stress, may be a factor in poor survival of oak seedlings under field conditions. Environmental entomology. Apr 1989. v. 18 (2). p. 235-239. Includes references. (NAL Call No.: DNAL QL461.E532).

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0642

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 PLPHA. Mehlhorn, H. Seufert, G.; Schmidt, A.; Kunert, K.J. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1986. v. 82 (1). p. 336-338. Includes 18 references. (NAL Call No.: DNAL 450 P692).

0643

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 JUSTED. Hall, O. Olson, E. East Lansing, Mich. : Association of Official Seed Analysts. Journal of seed technology. 1986. v. 10 (1). p. 58-61. Includes 8 references. (NAL Call No.: DNAL SB113.2.J6).

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 TPLNA. Odum, K.D. Colombo, S.J. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1987. v. 38 (4). p. 23-26. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0645

**Effect of timing of cold storage on cold hardiness and root growth potential of Douglas-fir.**  
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0646

**Effect of trunk injection of flurprimidol and paclobutrazol on sprout growth in silver maple.**  
JOARD. Arron, G.P. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1986. v. 12 (9). p. 233-236. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

0647

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TPLNA. Heidmann, L.J. Cornett, Z.U. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Spring 1986. v. 37 (2). p. 15-19. Includes 16 references. (NAL Call No.: DNAL 1.962 C5T71).

0648

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PLPHA. Norby, R.J. O'Neill, E.G.; Luxmoore, R.J. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1986. v. 82 (1). p. 83-89. Includes 30 references. (NAL Call No.: DNAL 450 P692).

0649

**Effects of atmospheric deposition on sulfur and nitrogen content of four urban tree species.**  
JOARD. Roberts, B.R. Dochinger, L.S.; Townsend, A.M. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1986. v. 12 (9). p. 209-212. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Effects of chronic doses of ozone on loblolly pine: photosynthetic characteristics in the third growing season.**  
FOSCA. Sasek, T.W. Richardson, C.U. Bethesda, Md. : Society of American Foresters. Gas exchange characteristics of loblolly pine seedlings were measured in the third growing season of ozone fumigations to determine the effects of long-term ozone exposure on photosynthetic capacity. Light and CO<sub>2</sub> response curves indicated significant decreases of 21% and 27%, respectively, in light-saturated and CO<sub>2</sub>-saturated photosynthetic capacities at 2 X ambient ozone (92 ppb 12-hr seasonal mean) compared to charcoal-filtered (CF) air, approximately 0.5 X ambient ozone (29 ppb 12-hr seasonal mean). Differences in the response curves suggest changes in light-harvesting and biochemical efficiencies as well as changes in the activity of RuBP Carboxylase and the

regeneration rate of RuBP. Chlorophyll and carotenoid conditions per unit leaf area were decreased at the high ozone treatment in older flushes. Stomatal resistance limited photosynthesis by about 29% in both CF and 2 X ambient ozone treated plants, suggesting that chronic ozone exposure did not affect stomatal control in loblolly pine. Forest science. Sept 1989. v. 35 (3). p. 745-755. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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FOSCA. Bassman, J.H. Dickmann, D.I. Washington : Society of American Foresters. Forest science. June 1985. v. 31 (2). p. 358-366. ill. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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EVETEX. Bause, E. Hardy, Y. College Park, Md. : Entomological Society of America. Analysis of rawfiber content of balsam fir, *Abies balsamea* (L.) Miller, needles in conjunction with laboratory-reared larvae of spruce budworm, *Choristoneura fumiferana* (Clemens), during the 1985 growing season indicated significant variations in the quality of food available for consumption by the insect. Two consecutive years of defoliation as well as poor drainage were directly related to higher rawfiber content of the current year's foliage which, in turn, caused a decrease in pupal weight, larval development rate, and survival. Environmental entomology. Aug 1988. v. 17 (4). p. 671-674. Includes references. (NAL Call No.: DNAL QL461.E532).

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Binder, W.D. Fielder, P. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 122-126. ill. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Effects of ethylene on development and field performance of loblolly pine seedlings.**

Barnett, J.P. Johnson, J.D.; Stumpff, N.J. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 48-53. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Effects of extended prechilling on laboratory germination and fungal infection in seeds of white spruce and eastern white pine.**

TPLNA. Mittal, R.K. Wang, B.S.P.; Harmsworth, D. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1987. v. 38 (4). p. 6-9. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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XFPNA. Radwan, M.A. Portland, Or. : The Station. USDA Forest Service research paper PNW-RP - United States, Pacific Northwest Research Station. July 1987. (375). 14 p. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

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AUBOA. Day, F.P. Jr. Baltimore, Md. : Botanical Society of America. American journal of botany. Oct 1987. v. 74 (10). p. 1541-1554. Includes references. (NAL Call No.: DNAL 450 AM36).

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AMNAA. Jones, R.H. Sharitz, R.R.; McLeod, K.W. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1989. v. 121 (1). p. 165-175. Includes references. (NAL Call No.: DNAL 410 M58).

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Mitcham-Butler, E.J. Hinesley, L.E.; Pharr, D.M. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1988. v. 6 (1). p. 1-4. Includes references. (NAL Call No.: DNAL SB1.J66).

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Kramer, P.J. Sionit, N. Washington, D.C. : Conservation Foundation, c1987. The Greenhouse effect, climate change, and U.S. forests / edited by William E. Shands and John S. Hoffman. p. 219-246. Includes references. (NAL Call No.: DNAL SD390.7.G73G74).

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FOSCA. Zutter, B.R. Gjerstad, D.H.; Glover, G.R. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 1016-1031. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Effects of O<sub>3</sub> on alder photosynthesis and symbiosis with Frankia.**

NEPHA. Greitner, C.S. Winner, W.E. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1989. v. 111 (4). p. 647-656. ill. Includes references. (NAL Call No.: DNAL 450 N42).

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### **Effects of pentachlorophenol on aquatic Hyphomycetes.**

MYCOAE. Barlocher, F. Premdas, P.D. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Jan/Feb 1988. v. 80 (1). p. 135-137. Includes references. (NAL Call No.: DNAL 450 M99).

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XFIPA. Bilderback, D.E. Carlson, C.E. Ogden, Utah : The Station. USDA Forest Service research paper INT - Intermountain Research Station. Aug 1987. (380). 3 p. Includes references. (NAL Call No.: DNAL A99.9 F764U).

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JSWCA3. Knipe, D.D. Ankeny, Iowa : Soil Conservation Society of America. Journal of soil and water conservation. Sept/Oct 1985. v. 40 (5). p. 445-447. Includes 10 references. (NAL Call No.: DNAL 56.8 J822).

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Appleton, B.L. Whitcomb, C.E.; Akers, S.W. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1986. v. 4 (3). p. 69-72. ill. Includes 4 references. (NAL Call No.: DNAL SB1.J66).

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### **The effects of seed origin on drought resistance of lodgepole pine (*Pinus contorta* Dougl.) seedlings.**

Murdiyarso, D. Roberts, J.M.; Milford, J.R. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 154-156. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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O'Connor, J.M. Dickmann, D.I. Ann Arbor, Mich. : The Michigan Academy of Science, Arts, and Letters. Michigan academician. Winter 1985. v. 17 (2). p. 137-147. Includes references. (NAL

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XFRMA. Van Haverbeke, D.F. Comer, C.W. Fort Collins, Colo. : The Station. USDA Forest Service research paper RM - United States, Rocky Mountain Forest and Range Experiment Station. Nov 1985. (263). 7 p. maps. Includes references. (NAL Call No.: DNAL A99.9 F7632U).

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**The effects of using pollen contaminated with conidia of *Fusarium moniliforme* var. subglutinans on control-pollinated strobili of slash pine.**

Miller, T. Blakeslee, G.M.; Bramlett, D.L.; Matthews, F.R. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 232-239. Includes references. (NAL Call No.: DNAL A99.9 F769).

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HJHSA. Mazzola, M. Costante, J.F. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1987. v. 22 (2). p. 234-235. Includes references. (NAL Call No.: DNAL SB1.H6).

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XGNEA. Shortie, W.C. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 99-103. Includes references. (NAL Call No.: DNAL aSD11.U56).



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Stahle, D.W. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 54-58. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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SWNAA. Call, C.A. Owens, D.W. Austin : Southwestern Association of Naturalists. The Southwestern naturalist. Sept 11, 1986. v. 31 (3). p. 367-374. Includes references. (NAL Call No.: DNAL 409.6 S08).

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AJBOA. Kaul, K. Baltimore, Md. : Botanical Society of America. American journal of botany. Feb 1986. v. 73 (2). p. 242-245. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

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AJBOAA. Monson, R.K. Grant, M.C. Columbus, Ohio : Botanical Society of America. American journal of botany. July 1989. v. 76 (7). p. 1041-1047. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

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Sutherland, C. Newsome, T. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 195-198. Includes references. (NAL Call No.: DNAL aSD11.A42).

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Maass, D.I. Colgan, A.N.; Cochran, N.L.; Haag, C.L.; Hatch, J.A. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Dec 1989. v. 6 (4). p. 183-185. Includes references. (NAL Call No.: DNAL SD143.N6).

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**Field studies of photosynthetic and growth responses to irradiance in three forest understory species of the C4 grass genus Muhlenbergia.**

BOGAA. Smith, M. Martin, C.E. Chicago, Ill. : University of Chicago Press. Botanical gazette. Dec 1987. v. 148 (4). p. 456-462. Includes references. (NAL Call No.: DNAL 450 B652).

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PPASA. Halma, J.R. Rieker, D.; Majumdar, S.K. Allentown, Pa. : The Academy. Proceedings of the Pennsylvania Academy of Science. 1986. v. 60 (1). p. 39-42. maps. Includes references. (NAL Call No.: DNAL 500 P383).

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**Fire frequency and old trees in the Southern Canadian Rockies.**

Pruden, M.A. Fryer, G.I.; Johnson, E.A. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 175-179. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**Fire history of lodgepole pine of Mt. San Jacinto, California.**

Sheppard, P.R. Lassoie, J.P. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 155-162. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**First-year field performance of Douglas-fir seedlings in relation to nursery characteristics.**

Omi, S.K. Howe, G.T.; Duryea, M.L. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 29-34. maps. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**First-year growth of hybrid poplar shoots from cutting or coppice origin.**

FDSCA. Bergez, J.E. Auclair, D.; Bouvarel, L. Bethesda, Md. : Society of American Foresters. Height growth, mortality, and dry woody biomass were studied on hybrid poplar shoots during their first year after coppicing or during the year of establishment from cuttings. Two coppice treatments (1- and 2-year rotations) and two treatments for cuttings (irrigated or not) were compared. A slight delay was observed in the height growth of cuttings compared to coppice treatments, but total height growth was not significantly different between treatments at the end of the growing season. Irrigation reduced mortality during establishment of cuttings. Total biomass produced was higher in the coppice stands, due to a greater number of shoots per stool. Coppice maintained its growth capacity even after the fifth 1-year cycle. Forest science. Dec 1989. v. 35 (4). p. 1105-1113. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Flood-tolerant trees.**

JFUSA. Loucks, W.L. Bethesda, Md. : Society of American Foresters. Journal of forestry. Mar 1987. v. 85 (3). p. 36-40. ill. Includes references. (NAL Call No.: DNAL 99.8 F768).

0716

**Flooding, stand structure, and stand density and their effect on pin oak growth in southeastern Missouri.**

Rogers, R. Sander, I.S. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 299-302. Includes references. (NAL Call No.: DNAL aSD11.U57).

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JOARD. Ellmore, G.S. Phair, W.E.; Gill, C.; Skinner, D. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Oct 1988. v. 14 (10). p. 233-239. ill. Includes references. (NAL Call No.: DNAL SB436.U6).

0718

**Fluoride-induced enhancement and inhibition of photosynthesis in four taxa of Pinus.**

NEPHA. Doley, D. New York, N.Y. : Cambridge University Press. The New phytologist. Sept 1988. v. 110 (1). p. 21-31. Includes references. (NAL Call No.: DNAL 450 N42).

0719

**Fluoride-induced enhancement and inhibition of shoot growth in four taxa of Pinus.**

NEPHA. Doley, D. New York, N.Y. : Cambridge University Press. The New phytologist. Aug 1989. v. 112 (4). p. 543-552. Includes references. (NAL Call No.: DNAL 450 N42).

0720

**Flux of ethylene from leaves treated with a polar or non-polar ethylene-releasing compound.**

JOSHB. Beaudry, R.M. Kays, S.J. Alexandria, Va. : The Society. Flux of ethylene from adaxial applications of Ethrel and Silaid to amphistomatous leaves was examined. Following application of Ethrel to amphistomatous leaves in the dark (i.e., closed stomata) or hemistomatous leaves in the light, steady-state ethylene evolution was almost entirely adaxial. When stomata of amphistomatous leaves were

fully open, abaxial ethylene flux for Ethrel was about 45% of the total ethylene evolved. Abaxial ethylene flux could then be dramatically reduced by stomatal closure induced by low light levels. Steady-state abaxial flux of ethylene from Silaid on amphistomatous leaves in the dark or hemistomatous leaves in the light was usually equal to or greater than adaxial ethylene flux. When stomata of amphistomatous leaves were fully open, flux of ethylene from Silaid was invariably equal from both leaf surfaces. Flux of Silaid- or Ethrel-derived ethylene from one leaf surface was reduced by increasing air velocity on the opposite side of the leaf, but only on amphistomatous leaves following light-induced stomatal opening. For Ethrel, the effect of air velocity was greater when the side of the leaf to which Ethrel had been applied was exposed to the increased air flow. No similar effect was found for Silaid. Closure of stomata on amphistomatous leaves and use of hemistomatous leaf material prevented any air velocity effect. Data indicate little to no entry of Ethrel or Ethrel-derived ethylene into the side of a leaf that lacks stomata or whose stomata are tightly closed. Significant movement of Silaid into leaf tissues probably occurs regardless of stomatal status, resulting in considerable release of ethylene within the leaf. Chemical names used: (2-chloroethyl)phosphonic acid (Ethrel); (2-chloroethyl) methylbis(phenylmethoxy)silane (Silaid). Journal of the American Society for Horticultural Science. Sept 1988. v. 113 (5). p. 784-789. Includes references. (NAL Call No.: DNAL 81 S012).

0721

**Foliar nitrogen content at lifting correlates with early growth of loblolly pine seedlings from 20 nurseries.**

SJAFD. Larsen, H.S. South, D.B.; Boyer, J.N. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1988. v. 12 (3). p. 181-185. Includes references. (NAL Call No.: DNAL SD1.S63).

0722

**Foliar nutrient composition of Juniperus osteosperma and environmental interactions.**

FOSCA. Bunderson, E.D. Weber, D.J. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1986. v. 32 (1). p. 149-156. maps. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0723

**Forests are dying but is acid rain really to blame?**

AUDUAD. Luoma, J.R. New York, N.Y. : National Audubon Society. Audubon. Mar 1987. v. 89 (2). p. 36-38, 40, 41, 44-46, 48-51. ill., maps. (NAL Call No.: DNAL S900.A8).



## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0724

**A freezing-cuff technique for studies on water relations of trees.**

Glatzel, G. Logan, Utah : Utah State University, 1987? . Proceedings of International Conference on Measurement of Soil and Plant Water Status : in commemoration of the centennial of Utah State University, July 6-10, 1987, Logan, Utah. v. 2 p. 173-175. ill. Includes references. (NAL Call No.: DNAL QK870.I5 1987).

0725

**Frost hardiness in Eucalyptus grandis: a possible molecular mechanism.**

Bolte, M.L. Crow, W.D.; Paton, D.M. New York : Alan R. Liss. Plant biology. In the series analytic: Plant Cold Hardiness / edited by P.H. Li. Proceedings of an International Seminar, September 4-7, 1986, Shanghai, China. 1987. v. 5. p. 129-139. Includes references. (NAL Call No.: DNAL QH301.P535).

0726

**Frost hardiness of coniferous seedlings: principles and applications.**

Glerum, C. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. Literature review. p. 107-123. ill. Includes references. (NAL Call No.: DNAL SD404.E93).

0727

**Frost resistance in Eucalyptus: Are plant growth regulators involved?.**

Paton, D.M. New York : Alan R. Liss. Plant biology. In the series analytic: Plant Cold Hardiness / edited by P.H. Li. Proceedings of an International Seminar, September 4-7, 1986, Shanghai, China. 1987. v. 5. p. 117-127. Includes references. (NAL Call No.: DNAL QH301.P535).

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**Gas exchange between forest and atmosphere.**

Murphy, C.E. Jr. Washington, D.C. : U.S. Dept. of Energy, 1987. Proceedings of the Forest-Atmosphere Interaction Workshop, Lake Placid, New York, October 1-4, 1985 / coordinated and edited by Harry Moses ... et al. . p. 147-181. ill. Includes references. (NAL Call No.: DNAL SD390.5.F6 1985).

0729

**Gene exchange in loblolly pine: the relation between pollination mechanism, female receptivity and pollen availability.**

AJBOA. Greenwood, M.S. Baltimore, Md. : Botanical Society of America. American journal of botany. Oct 1986. v. 73 (10). p. 1443-1451. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0730

**A geobotanical investigation based on linear discriminant and profile analyses of airborne Thematic Mapper Simulator data.**

RSEEA. Schwaller, M.R. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Oct 1987. v. 23 (1). p. 23-34. Includes references. (NAL Call No.: DNAL Q184.R4).

0731

**Geographic differences in the seed germination of paper birch (Betula papyrifera).**

AJBOA. Bevington, J. Baltimore, Md. : Botanical Society of America. American journal of botany. Apr 1986. v. 73 (4). p. 564-573. Includes references. (NAL Call No.: DNAL 450 AM36).

0732

**Geographic variation of red pine survival, growth and productivity in a Minnesota field test.**

Nelson, C.D. Mohn, C.A.; Stewart, W.K. Madison, Wis. : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. Conference held August 10-12, 1987, Fargo, North Dakota. 1987? . p. 43-50. maps. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0733

**Germinability of cook pine (Araucaria columnaris) seeds under different storage conditions.**

TPLNA. Scowcroft, P.G. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1988. v. 39 (3). p. 17-25. ill. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0734

**Germination and field establishment of juniper in the Southwest.**

XGTIA. Fisher, J.T. Fancher, G.A.; Neumann, R.W. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at a

"Conference on Pinyon-Juniper," January 13-16, 1986, Reno, Nevada. Jan 1987. (215). p. 293-299. Includes references. (NAL Call No.: DNAL aSD11.A48).

0735

**Glutamine synthetase/glutamate synthase pathway for ammonium assimilation in beech ectomycorrhizas.**

Martin, F. Genetet, I.; Stewart, G. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 357. (NAL Call No.: DNAL aQK604.N6 1984).

0736

**Gradients of intercellular CO<sub>2</sub> levels across the leaf mesophyll.**

PLPHA. Parkhurst, D.F. Wong, S.C.; Farquhar, G.D.; Cowan, I.R. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Apr 1988. v. 86 (4). p. 1032-1037. Includes references. (NAL Call No.: DNAL 450 P692).

0737

**Grass and forb species for revegetation of mixed soil-lignite overburden in east central Texas.**

JSWCA3. Skousen, J.G. Call, C.A. Ankeny, Iowa : Soil Conservation Society of America. Journal of soil and water conservation. Nov/Dec 1988. v. 42 (6). p. 438-442. Includes references. (NAL Call No.: DNAL 56.8 J822).

0738

**Green ash establishment following transplant.**

JOSH8. Arnold, M.A. Struve, D.K. Alexandria, Va. : The Society. Bare-root 1-year-old green ash (*Fraxinus pennsylvanica* Marsh.) seedlings were transplanted into root observation boxes under greenhouse conditions to study timing of budbreak, root regeneration, and subsequent shoot growth during establishment. Green ash seedlings began shoot growth before root growth. Seven to 20 days after transplant, intact second- and third-order lateral roots (referred to here after as intact roots) began to elongate, followed 10 to 19 days later by initiation of long roots from callus at pruned root surfaces. Plants with earlier budbreak were larger and regenerated more roots faster than plants that broke bud later. During establishment, there was a strong correlation between shoot and intact root elongation and a low correlation between shoot and long root elongation. Root pruning after establishment resulted in bud set and/or cessation of shoot

elongation within 3 to 6 days in 1985 and within 20 to 28 days in 1986. The days to bud set and cessation of shoot elongation were positively correlated with increased numbers of regenerated roots from pruned surfaces (long roots). Only long root elongation was significantly correlated with shoot growth after root pruning. Root pruning also induced reductions (12 days) in net photosynthesis, transpiration, and stomatal conductance, and increased stomatal resistance to water loss; however, all recovered after root regeneration. Journal of the American Society for Horticultural Science. July 1989. v. 114 (4). p. 591-595. Includes references. (NAL Call No.: DNAL 81 S012).

0739

**Growth.**

Jones, J.R. Schier, G.A. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. 1985. (119). p. 19-24. ill. (NAL Call No.: DNAL aSD11.A42).

0740

**Growth and chemical composition of *Populus deltoides* X *nigra* grown in field-grow fabric containers.**

Chong, C. Lumis, G.P.; Cline, R.A.; Reissmann, H.J. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. June 1987. v. 5 (2). p. 45-48. ill. Includes references. (NAL Call No.: DNAL SB1.J66).

0741

**Growth and heavy metal accumulation in pine seedlings grown with sewage sludge.**

JEVQAA. Berry, C.R. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. July/Sept 1985. v. 14 (3). p. 415-419. Includes references. (NAL Call No.: DNAL QH540.J6).

0742

**Growth and morphological responses to irradiance in three forest understory species of the C<sub>4</sub> grass genus *Muhlenbergia*.**

BOGAA. Smith, M. Martin, C.E. Chicago, Ill. : University of Chicago Press. Botanical gazette. June 1987. v. 148 (2). p. 141-148. ill. Includes references. (NAL Call No.: DNAL 450 B652).



0743

**Growth and nutrient content of red spruce seedlings in soil amended with aluminum.**

JEVQAA. Ohno, T. Sucoff, E.I.; Erich, M.S.; Bloom, P.R.; Buschena, C.A.; Dixon, R.K. Madison, Wis. : American Society of Agronomy. Aluminum toxicity may be a factor linking acid deposition to forest decline. Acid precipitation may lower soil pH, which would raise the level of phytotoxic forms of Al in soil solution. A greenhouse study was conducted to examine the effects of soil Al on the growth and nutrient composition of red spruce (*Picea rubens* Sarg.). A Becker series forest soil (Typic Fragiorthod) was amended with AlCl<sub>3</sub> to give a range of saturated paste extract Al concentrations from 37 to 537 micromol L<sup>-1</sup> at harvest. Bare-rooted seedlings were transplanted into pots and grown for 52 d. Biomass of needles, primary roots, and lateral roots were not significantly decreased by soil Al levels. The biomass of needles were negatively correlated with the concentration of Al in the needles. All seedlings were P-deficient, which may account for the lack of response to soil Al levels. The concentration of Al in seedling needles increased significantly with increasing soil Al levels, but not in the primary or lateral roots. The concentration of Mn in seedling needles, primary roots, and lateral roots decreased with higher concentrations of Al in the soil. The concentrations of N, P, K, Ca, Mg, Fe, Zn, Cu, and B in the needles were not affected by soil Al. However, the Mg, Ca, and B concentrations in both primary and lateral roots were significantly lower with increasing levels of soil Al. Increasing soil Al levels resulted in lower nitrification rates in the soils. The addition of Al significantly reduced colonies of bacteria relative to the control soil. However, fungi/actinomycetes colonies were not significantly reduced by soil Al. Journal of environmental quality. Oct/Dec 1988. v. 17 (4). p. 666-672. Includes references. (NAL Call No.: DNAL QH540.J6).

0744

**Growth and nutrient status of black spruce seedlings as affected by water table depth.**

Czapowskyj, M.M. Rourke, R.V.; Grant, W.J. Broomall, Pa. : The Station. USDA Forest Service Research Paper NE-RP - Northeastern Forest Experiment Station. Aug 1986. (591). 9 p. Includes references. (NAL Call No.: DNAL A99.9 F7622UN).

0745

**Growth and survival of eastern cottonwood in Kentucky.**

SJAFD. Stringer, J.W. Shain, L.; Wittwer, R.F. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1987. v. 11 (2). p. 73-76. Includes references. (NAL Call No.: DNAL SD1.S63).

0746

**Growth and survival of hybrid poplar and Populus deltoides clones in east central Wisconsin.**

Wyckoff, G.W. Einspahr, D.W.; Dinus, R.J. Madison, Wis. : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. Conference held August 10-12, 1987, Fargo, North Dakota.~ Includes statistical data. 1987? . p. 187-196. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0747

**Growth and survival of slash pine seedlings in a Florida nursery.**

TPLNA. Haack, R.A. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Spring 1988. v. 39 (2). p. 30-36. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0748

**Growth and water relations of Douglas fir (Pseudotsuga menziesii) seedlings under different weed control regimes.**

WEESA6. Newton, M. Preest, D.S. Champaign, Ill. : Weed Science Society of America. Growth of Douglas fir *Pseudotsuga menziesii* (Mirb.) Franco was increased by controlling grasses and broadleaf herbs with eight herbicide regimes during the first 3 yr after planting on a well-drained moist site in the Oregon Coast Range. The greatest growth occurred if weeds were controlled in the same growing season that tree seedlings were transplanted to the field; smaller increments came from second- and third-year weed control. Growth increases attributable to early weed control continued through the fifth year, indicating that conditions during establishment strongly influenced later growth. Plots with no herbaceous vegetation had more available soil water than those with competing vegetation, and tree seedlings on these plots experienced less water stress. Irrigation in the third year increased stem diameter of seedlings in that year but had no effect thereafter. Increases in average seedling stem volume at 5 yr after transplanting were linearly related ( $r^2 = 0.77$ ) to the difference in observed xylem potential during the first three growing seasons after transplanting and the xylem potential at which photosynthesis ceased; -2 MPa. Weed science. Sept 1988. v. 36 (5). p. 653-662. Includes references. (NAL Call No.: DNAL 79.8 W41).

0749

**Growth and yield of spruce in the Inland Mountain West: a literature review.**

XGTIA. Larocque, G. Marshall, P.L. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented

at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT.~ Literature review. Apr 1988. (243). p. 192-196. Includes references. (NAL Call No.: DNAL aSD11.A48).

0750

**Growth declines in red spruce.**

JFUSA. Zedaker, S.M. Hyink, D.M.; Smith, D.W. Bethesda, Md. : Society of American Foresters. Journal of forestry. Jan 1987. v. 85 (1). p. 34-36. ill. Includes references. (NAL Call No.: DNAL 99.8 F768).

0751

**Growth differences among patented grafts, seed orchard seedlings, and nursery-run seedlings of black walnut.**

TPLNA. Hammitt, W.E. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1989. v. 40 (3). p. 29-32. ill. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0752

**Growth dynamics and water use of seedlings of Quercus alba L. in CO2-enriched atmospheres.**

NEPHA. Norby, R.J. O'Neill, E.G. New York, N.Y. : Cambridge University Press. The New phytologist. Mar 1989. v. 111 (3). p. 491-500. Includes references. (NAL Call No.: DNAL 450 N42).

0753

**Growth estimates in natural white pine stands over two decades.**

GTRWD. Cooke, R.R. Barrett, J.P. Washington, D.C. : The Service. General technical report WO - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 46-50. Includes references. (NAL Call No.: DNAL aSD11.U52).

0754

**Growth in male and female aspen clones: a twenty-five-year longitudinal study.**

ECOLA. Sakai, A.K. Burris, T.A. Tempe, Ariz : Ecological Society of America. Ecology : a publication of the Ecological Society of America. Dec 1985. v. 66 (6). p. 1921-1927. Includes references. (NAL Call No.: DNAL 410 EC7).

0755

**Growth of chemically root-pruned seedlings in the greenhouse and the field.**

Wenny, D.L. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 32-37. Includes references. (NAL Call No.: DNAL aSD11.A42).

0756

**Growth of forbs, shrubs, and trees on bentonite mine spoil under greenhouse conditions.**

JRMGA. Uresk, D.W. Yamamoto, T. Denver, Colo. : Society for Range Management. Journal of range management. Mar 1986. v. 39 (2). p. 113-117. Includes references. (NAL Call No.: DNAL 60.18 J82).

0757

**Growth of mycorrhizal birch in elevated levels of copper and nickel.**

Jones, M.D. Hutchinson, T.C. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 363. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0758

**Growth of nitrogen-fertilized and thinned quaking Aspen (Populus tremuloides Michx.).**

Perala, D.A. Laidly, P.R. St. Paul, Minn. : The Station. Research paper NC - U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 1989. (286). 8 p. Includes references. (NAL Call No.: DNAL aSD11.A34).

0759

**Growth of young black walnut plantations in Kentucky.**

Kalisz, P.J. Stringer, J.W.; Hill, D.B. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Mar 1989. v. 6 (1). p. 17-20. ill. Includes references. (NAL Call No.: DNAL SD143.N6).



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0760

### **Growth patterns of gemmlings of *Lycopodium lucidulum*.**

AMFJA. Reutter, U. Burlington, Vt. : The American Fern Society. American fern journal. Apr/June 1987. v. 77 (2). p. 50-57. ill. Includes references. (NAL Call No.: DNAL 450 AM35).

0761

### **Growth-rate trends of pines since 1930 in the northeastern United States.**

Whiton, J.C. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 372-381. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

0762

### **Growth rate variation in *Quercus rubra* in three north central U.S. provenance tests by age 23.**

Kriebel, H.B. Merritt, C.; Stadt, T. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 79-81. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0763

### **Growth rates after fertilizing lodgepole pine.**

Cochran, P.H. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Jan 1989. v. 4 (1). p. 18-20. Includes references. (NAL Call No.: DNAL SD388.W6).

0764

### **Growth rates for managed stands of white fir.**

XGTIA. Cochran, P.H. Oliver, W.W. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 197-200. Includes references. (NAL Call No.: DNAL aSD11.A48).

0765

### **Growth response of a boreal black spruce stand to fertilizer treatments.**

Foster, N.W. Morrison, I.K.; Swan, H.S.D. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Dec 1986. v. 3 (4). p. 142-144. Includes references. (NAL Call No.: DNAL SD143.N6).

0766

### **Growth response of green and white ash seedlings to ozone, sulfur dioxide, and simulated acid rain.**

FDSCA. Chappelka, A.H. Chevone, B.I.; Burk, T.E. Bethesda, Md. : Society of American Foresters. Nine-week-old green (*Fraxinus pennsylvanica* Marsh.) and white (*F. americana* L.) ash were exposed to O<sub>3</sub> and/or SO<sub>2</sub> (control, 0.10 ppm O<sub>3</sub>, 0.08 ppm SO<sub>2</sub>, or 0.10 ppm O<sub>3</sub> + 0.08 ppm SO<sub>2</sub>) for 4 h d<sup>-1</sup>, 5 d wk<sup>-1</sup> in combination with simulated rain (pH 3.0, 4.3 or 5.6, 1 h d<sup>-1</sup>, 2 d wk<sup>-1</sup> at 0.75 cm h<sup>-1</sup>) for 6 weeks, under controlled laboratory conditions, with rain applied either just before or after fumigation. Across all rain treatments, white ash biomass was suppressed by the application of O<sub>3</sub> and cumulative shoot elongation of green ash exposed to O<sub>3</sub> and/or SO<sub>2</sub> was less than controls. The combination of O<sub>3</sub> + SO<sub>2</sub> did not affect the growth of either species more than the pollutants applied alone. Leaf area ratio (LAR) and root to shoot ratio (RSR) exhibited quadratic responses to rain pH in green ash, across all pollutant treatments. Significant pollutant X pH interactions occurred in leaf weight ratio (LWR) in green ash and LAR and RSR in white ash. Significant linear increases in LAR and decreases in RSR, with decreasing pH, were observed for O<sub>3</sub> and SO<sub>3</sub>-treated white ash. These findings are discussed relative to implications of the effects of gaseous pollutants in combination with acid rain on green and white ash growth. FDR. SCI. 34(4):1016-1029. Forest science. Dec 1988. v. 34 (4). p. 1016-1029. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0767

### **Growth response of suppressed true fir and mountain hemlock after release.**

XFPNA. Seidel, K.W. Portland, Or. : The Station. USDA Forest Service research paper PNW - United States, Pacific Northwest Forest and Range Experiment Station. Oct 1985. (344). 22 p. maps. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

0768

### **Growth response of umbrella pine as influenced by temperature, photoperiod and chilling.**

Blazich, F.A. Wright, R.D. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Dec 1986. v. 4 (4). p. 145-148. Includes 19 references. (NAL Call No.: DNAL SB1:J66).

0769

### **Growth responses and delayed winter hardening in Sitka spruce following summer exposure to ozone.**

NEPHA. Lucas, P.W. Cottam, D.A.; Sheppard, L.J.; Francis, B.J. New York, N.Y. : Cambridge University Press. The New phytologist. Apr

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1988. v. 108 (4). p. 495-504. Includes references. (NAL Call No.: DNAL 450 N42).

0770

**Growth, yield, and value projections for black walnut interplantings with black alder and autumn olive.**

Campbell, G.E. Dawson, J.O. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Sept 1989. v. 6 (3). p. 129-132. Includes references. (NAL Call No.: DNAL SD143.N6).

0771

**Gypsy moth handbookjudging vigor of deciduous hardwoods.**

Wargo, Philip M. Washington, D.C. : U.S. Dept. of Agriculture, Combined Forest Pest Research and Development Program, 1988. Cover title.~ "Issued November 1978"--P. 4 of cover.~ "By Philip M. Wargo."--P.3. 15, 1 p. : ill. ; 23 cm. Bibliography: p. 14- 16 . (NAL Call No.: DNAL 1 Ag84Ab no.418 1988).

0772

**Hardwood plantation growth following weed control using herbicides and cultivation.**

SJAFD. Zutter, B.R. Nelson, L.R.; Minogue, P.J.; Gjerstad, D.H. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1987. v. 11 (3). p. 134-138. Includes references. (NAL Call No.: DNAL SD1.S63).

0773

**Heat unit summation theory in commercial nursery management.**

Hodgson, T.J. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 64-71. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

0774

**Heating system, germination temperature and post germination fertilizer regime effects on white spruce nursery growth.**

Hawkins, C.D.B. Draper, D.A.; Eng, R.Y.N. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 50-53. (NAL Call No.: DNAL aSD11.A42).

0775

**Height and diameter growth response in loblolly pine stands following fertilization.**

FOSCA. Bolstad, P.V. Allen, H.L. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1987. v. 33 (3). p. 644-653. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0776

**Height control of interior spruce by means of photoperiodic induction.**

Hawkins, C.D.B. Draper, D.A. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 45-49. Includes references. (NAL Call No.: DNAL aSD11.A42).

0777

**Height growth of loblolly and slash pine plantations in the northern post-oak belt of Texas.**

SJAFD. Hansen, R.S. Bilan, M.V. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1989. v. 13 (1). p. 5-8. maps. Includes references. (NAL Call No.: DNAL SD1.S63).

0778

**Herbicide conversion of a sand shinnery oak (Quercus havardii) community: effects on biomass.**

JRMGA. Sears, W.E. Britton, C.M.; Wester, D.B.; Pettit, R.D. Denver, Colo. : Society for Range Management. Journal of range management. Sept 1986. v. 39 (5). p. 399-403. Includes references. (NAL Call No.: DNAL 60.18 J82).

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**Heritability in sugar maple families suggest breeding for response to wounding would pay.**

Garrett, P.W. Funk, D.T.; Hawley, G.J.; Wendel, G.W. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. June 1989. v. 6 (2). p. 59-61. ill. Includes references. (NAL Call No.: DNAL SD143.N6).



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0780

**History of the chemical environment from elemental analysis of tree rings.**  
McClenahan, J.R. Vimmerstedt, J.P.; Lathrop, R.C. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 690-694. (NAL Call No.: DNAL QK477.2.A6I5 1986).

0781

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HUHSA. Powell, L.E. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Mechanisms of Rest and Dormancy of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 12, 1986, Davis, California.~ Literature review. Oct 1987. v. 22 (5). p. 845-850. Includes references. (NAL Call No.: DNAL SB1.H6).

0782

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XFGTA. Somers, P.W. Van Sambeek, J.W.; Gaffney, G.R. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 175-180. Includes references. (NAL Call No.: DNAL aSD11.A352).

0783

**Host responses.**  
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0784

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Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. 1988. (420-186). 1 p. ill. (NAL Call No.: DNAL S544.3.V8V52).

0785

**Hypogeous, mycorrhizal fungi associated with ponderosa pine: sporocarp phenology.**  
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0786

**Hypoxylon mammatum ascospore infection of Populus tremuloides clones: effects of moisture stress in tissue culture.**  
PHYTAJ. Belanger, R.R. Manion, P.D.; Griffin, D.H. St. Paul, Minn. : American Phytopathological Society. Tissues from six aspen clones were cultured to produce plantlets from dormant buds. Plantlets of 1-2 cm were moisture stressed by adding various concentrations of mannitol to the growth medium. Inoculation of unwounded plantlets with ascospores of Hypoxylon mammatum resulted in visible signs of mycelium after 3-4 days. After 10 days, mycelial growth on controls and moderately stressed plants remained superficial; in contrast, highly stressed plants were invaded by the mycelium and exhibited necrotic lesions at the site of inoculation. The level of moisture stress needed for mycelium invasion and lesion development varied (-0.45 to -1.2 MPa) among the clones. Clonal differences observed could be applied in basic physiological studies or in aspen breeding programs for hypoxylon canker resistance. Phytopathology. Mar 1989. v. 79 (3). p. 315-317. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

0787

**The identity and metabolic fate of volatiles responsible for the odor of Hydnellum suaveolens.**  
MYCOAE. Wood, W.F. DeShazer, D.A.; Largent, D.L. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Mar/Apr 1988. v. 80 (2). p. 252-255. Includes references. (NAL Call No.: DNAL 450 M99).

0788

**The impact of chronic cadmium exposure on growth of pin oak seedlings.**  
FOSCA. Kazimir, J. Brennan, E. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 1061-1066. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0789

**Impact of lift date and storage on field performance for Douglas-fir and western hemlock.**

Dunsworth, B.G. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 199-206. Includes references. (NAL Call No.: DNAL ASD11.A42).

0790

**Implications of research on lodgepole pine introduction in interior Alaska.**

XFPNA. Alden, J.N. Portland, Or. : The Station. Research paper PNW - U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Sept 1988. (402). 29 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

0791

**Incomplete abscission of needle clusters and resin release from artificially water-stressed loblolly pine (*Pinus taeda*): a component for plant-animal interactions.**

AJBOA. Heikkinen, H.J. Scheckler, S.E.; Egan, P.J.J. Jr.; Williams, C.B. Jr. Baltimore, Md. : Botanical Society of America. American journal of botany. Oct 1986. v. 73 (10). p. 1384-1392. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0792

**Increased release of host volatiles from feeding scars: a major cause of field aggregation in the pine weevil *Hylobius abietis* (Coleoptera: Curculionidae).**

EVETEX. Tilles, D.A. Hordlander, G.; Nordenhem, H.; Eidmann, H.H.; Wassgren, A.B.; Bergstrom, G. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1986. v. 15 (5). p. 1050-1054. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

0793

**Increasing forest productivity and value of temperate coniferous forest by manipulating site water balance.**

Jarvis, P.G. Centralia, Wash. : Weyerhaeuser Co., c1985. Forest potentials : productivity and value : proceedings of a symposium held at Tacoma, Washington, August 20-24, 1984. p. 39-74. Includes references. (NAL Call No.: DNAL SD431.W49 1984).

0794

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Graumlich, L.J. Brubaker, L.B. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 59-69. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

0795

**Increasing speed, accuracy, and safety of pressure chamber determinations of plant moisture stress.**

TPLNA. McGilvray, J.M. Barnett, J.P. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1988. v. 39 (3). p. 3-4. ill. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

0796

**Induced accumulation of foliage phenols in mountain birch: branch response to defoliation?**

AMNTA. Tuomi, J. Niemela, P.; Rousi, M.; Siren, S.; Vuorisalo, T. Chicago, Ill. : University of Chicago Press. The American naturalist. Oct 1988. v. 132 (4). p. 602-608. Includes references. (NAL Call No.: DNAL 470 AM36).

0797

**Induced changes in monoterpene composition of slash and longleaf pines.**

PPGGD. Kossuth, S.V. McReynolds, R.D. Lake Alfred, Fla. : The Society. Proceedings annual meeting - Plant Growth Regulator Society of America. 1987. (14th). p. 268-277. Includes references. (NAL Call No.: DNAL SB128.P5).

0798

**Induction of new host-coded proteins in *Pinus elliotii* seedlings in response to pathogen and water stress.**

Valluri, J.V. Soltes, E.J.; Newton, R.J.; Cobb, B.G. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 152-158. ill. Includes references. (NAL Call No.: DNAL A99.9 F769).



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0799

**Influence of alkaloids on feeding preference of eastern deciduous forest trees by the gypsy moth *Lymantria dispar*.**

AMNTA. Barbosa, P. Krischik, V.A. Chicago, Ill. : University of Chicago Press. The American naturalist. July 1987. v. 130 (1). p. 53-69. Includes references. (NAL Call No.: DNAL 470 AM36).

0800

**Influence of balsam woolly adelgid (Homoptera: Adelgidae) on monoterpenes found in bark and sapwood of Fraser fir.**

EVETEX. Arthur, F.H. Hain, F.P. College Park, Md. : Entomological Society of America. Environmental entomology. June 1987. v. 16 (3). p. 712-715. Includes references. (NAL Call No.: DNAL QL461.E532).

0801

**Influence of *Ceanothus velutinus* and associated forbs on the water stress and stemwood production of Douglas-fir.**

FDSCA. Petersen, T.D. Newton, M.; Zedaker, S.M. Bethesda, Md. : Society of American Foresters. Abstract: Stem dimensions for two age groups of Douglas-fir growing in the central Cascade Mountains of western Oregon were related to water-stress and the amount of interference from dense *Ceanothus velutinus* and forbs 8 years earlier. In 1978, three regimes were established in four 5-year-old and four 10-year-old stands by means of controls (no treatment) and two herbicide treatments to individual trees in each stand: a partial treatment (*C. velutinus* eliminated) and a complete treatment (both shrubs and forbs eliminated). In the subsequent year, soil water potential during late summer was less than -1.5 MPa at 10-, 40-, and 100-cm depths, where *C. velutinus* was growing with forbs. In the absence of shrubs and forbs, soil water potential at 100 cm was near field capacity throughout the 1979 growing season. Predawn stem water potential and Douglas-fir during late summer was significantly lower for trees competing with *C. velutinus* and forbs than for trees without competitors in the complete treatment, or for trees competing with forbs in the partial treatment, in the four 5-year-old stands and in two of the 10-year-old stands. By 1986, Douglas-fir stems were 2 to 6 cm larger in basal diameter and 1 to 2 m taller in the absence of competitors. Interference from *C. velutinus* and forbs had a greater effect on stem size of 5-year-old than 10-year-old trees. The correlation between growth and water stress suggests that interspecific competition for soil water during summer drought is a factor limiting stemwood production. FOR. SCI. 34(2):333-343. Forest science. June 1988. v. 34 (2). p. 333-343. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0802

**Influence of fall fertilization and moisture stress on growth and field performance of container-grown Douglas-fir seedlings.**

XGTIA. Jopson, T.M. Paul, J.L. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. June 1985. (185). p. 14-19. ill. Includes references. (NAL Call No.: DNAL aSD11.A48).

0803

**Influence of growth form on ecophysiological responses to variable sunlight in subalpine plants.**

ECOLA. Knapp, A.K. Smith, W.K. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Aug 1989. v. 70 (4). p. 1069-1082. Includes references. (NAL Call No.: DNAL 410 EC7).

0804

**Influence of light and temperature on germination of sourwood (*Oxydendrum arboreum* (L.) DC.).**

Barton, S.S. Bonaminio, V.P. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1985. v. 3 (3). p. 108-111. Includes 21 references. (NAL Call No.: DNAL SB1.J66).

0805

**Influence of photoperiod on winter growth of seven species of tropical landscape trees.**

Broschat, T.K. Donselman, H. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. June 1986. v. 4 (2). p. 60-62. Includes 9 references. (NAL Call No.: DNAL SB1.J66).

0806

**Influence of pruning at transplant time on growth and establishment of *Liquidambar styraciflua* L., sweet gum.**

Hummel, R.L. Johnson, C.R. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1986. v. 4 (3). p. 83-86. Includes 14 references. (NAL Call No.: DNAL SB1.J66).

0807

**Influence of site disturbance on delta 13C isotopic time series from tree rings.**

Leavitt, S.W. Long, A. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C.

Jacoby, J.W. Hornbeck. p. 119-129. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

0808

**Influence of sulfur gas on water loss rate in woody plants.**

SJECAH. Smirnov, I.A. New York, N.Y. : Consultants Bureau. The Soviet journal of ecology. Translated from: Ekologiya, v. 17 (3), 1986, p. 19-23, (QH540.E3). Jan 1987. v. 17 (3). p. 128-132. Includes references. (NAL Call No.: DNAL QH540.E32).

0809

**Influence of VA mycorrhiza on growth, nutrient absorption and water relations in *Leucaena leucocephala*.**

Huang, R.S. Smith, W.K.; Yost, R.S. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 411. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0810

**Influence of water stress and restricted root volume on growth and development of urban tress.**

JOARD. Krizek, D.T. Dubik, S.P. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture..Literature review. Feb 1987. v. 13 (2). p. 47-56. Includes references. (NAL Call No.: DNAL SB436.J6).

0811

**The inhibitory effect of neem (*Azadirachta indica*) leaf extracts on aflatoxin synthesis in *Aspergillus parasiticus*.**

JJASDH. Bhatnagar, D. McCormick, S.P. Champaign, Ill. : The Society. Journal of the American Oil Chemists' Society. July 1988. v. 65 (7). p. 1166-1168. Includes references. (NAL Call No.: DNAL 307.8 J82).

0812

**Insect antifeedant activity of four prieurianin-type limonoids.**

JNPRDF. Lidert, Z. Taylor, D.A.H.; Thirugnanam, M. Cincinnati, Ohio : American Society of Pharmacognosy. Journal of natural products. Sept/Oct 1985. v. 48 (5). p. 843-845. Includes 17 references. (NAL Call No.: DNAL 442.8 L77).

0813

**Insect pollination in the cycad *Zamia pumila* (Zamiaceae).**

AJBOA. Tang, W. Baltimore, Md. : Botanical Society of America. American journal of botany. Jan 1987. v. 74 (1). p. 90-99. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0814

**Interactions between ozone and plant cuticles. II. Water permeability.**

NEPHA. Kerstiens, G. Lendzian, K.J. New York, N.Y. : Cambridge University Press. The New phytologist. May 1989. v. 112 (1). p. 21-27. Includes references. (NAL Call No.: DNAL 450 N42).

0815

**Interactions of nitrogen, phosphorus and mycorrhizae inoculation on nutrient content and growth of *Pinus contorta*.**

Rousseau, J. Reid, C.P.P. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 340. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0816

**The interrelationship of plant water relations and herbivore population dynamics with reference to two species of *Salix* and *Malacosoma californicum pluviale*.**

WSEPA. Adams, A.B. Pullman, Wash. : The Society. Proceedings - Washington State Entomological Society. Apr/Nov 1987. (49). p. 830-841. ill. Includes references. (NAL Call No.: DNAL QL461.W3).

0817

**Involvement of vacuoles in ethylene metabolism in plant cells.**

NASSD. Bouzayen, M. Latche, A.; Pech, J.C.; Alibert, G. New York, N.Y. : Plenum Press. NATO advanced science institutes series : Series A : Life sciences. In the series analytic: Plant vacuoles: their importance in solute compartmentation in cells and their applications in plant biotechnology / edited by B. Marin. Proceedings of a Workshop, July 6-11, 1986, Sophia-Antipolis, France. 1987. 134. p. 449-454. Includes references. (NAL Call No.: DNAL QH301.N32).



## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0818

### **Is ethylene involved in ectomycorrhizae formation on mugo pine?**

Rupp, L.A. Mudge, K.W. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 355. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0819

### **Journey to the center of a tree.**

AMFDA. Shigo, A.A. Washington, D.C. : American Forestry Association. American forests. June 1986. v. 92 (6). p. 18-22, 46-47. ill. (NAL Call No.: DNAL 99.8 F762).

0820

### **Laboratory measurements of ozone removal by plants, and application to rural ozone records.**

Steinberger, E.H. Wurtele, M.G. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 400-403. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

0821

### **Large scalps improve survival and growth of planted conifers in central Idaho.**

XFIPA. Sloan, J.P. Ryker, R.A. Ogden, Utah : The Station. USDA Forest Service research paper INT - United States, Intermountain Forest and Range Experiment Station. June 1986. (366). 9 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764U).

0822

### **Leaf area, stemwood growth, and nutrition relationships in loblolly pine.**

FOSCA. Vose, J.M. Allen, H.L. Bethesda, Md. : Society of American Foresters. The relationships among loblolly pine (*Pinus taeda* L.) stand leaf area index (LAI), stemwood volume growth (m<sup>3</sup>/ha/yr), and growth efficiency (m<sup>3</sup> stemwood/ha/yr/LAI) were examined in three nitrogen (N) by phosphorus (P) fertilization field trials. Prior to fertilization, stocking levels and nitrogen limitations varied for the three stands. LAI increased significantly (up to 60%) following N fertilization on the two N deficient stands. Phosphorus additions did not affect LAI. Stemwood growth was positively and linearly related to LAI across treatments and stands. Variations in LAI across stands reflected the differences in stocking and N

availability. On average, a unit of LAI produced 7.3 m<sup>3</sup> stemwood/ha/yr. Growth efficiency was not affected by fertilization on two of the three stands. A decrease in growth efficiency at a projected LAI above 3.5 resulted from an asymptotic relationship between stemwood growth and LAI on a stand that was fully stocked and highly responsive to N fertilization. The use of LAI as an index of stocking is proposed because LAI integrates tree size, stand density, and site resource supply. In addition, it is proposed that the deviation of a stand's current LAI from the maximum supportable LAI based on fixed site factors (e.g., water, temperature) may provide a good measure of a stand's potential responsiveness to fertilization. For. Sci. 34(3):547-563. Forest science. Sept 1988. p. 547-563. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0823

### **Leaf-to-twigg transfer conserves nitrogen and phosphorus in nutrient poor and enriched cypress swamps.**

FOSCA. Dierberg, F.E. Straub, P.A.; Hendry, C.D. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 900-913. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0824

### **Levels-of-growing-stock cooperative study in Douglas-fir. Report no. 8. The LOGS study: twenty-year results.**

XFPNA. Curtis, R.O. Marshall, D.D. Portland, Or. : The Station. USDA Forest Service research paper PNW - United States, Pacific Northwest Forest and Range Experiment Station. Mar 1986. (356). 113 p. ill., maps. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

0825

### **Life history studies of *Conopholis americana* (Orobanchaceae).**

AMNAA. Baird, W.V. Riopel, J.L. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. July 1986. v. 116 (1). p. 140-151. ill. Includes references. (NAL Call No.: DNAL 410 M58).

0826

### **Light reduction and moisture stress: effects on containerized western larch seedlings.**

XGTIA. Vance, N.C. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. June 1985. (185). p. 126-128. ill. Includes references. (NAL Call No.: DNAL aSD11.A48).

0827

**Lignin peroxidase production by immobilized *Phanerochaete chrysosporium*.**

ANYAA9. Zhong, L.C. Linko, S.; Lindholm, N.; Linko, Y.Y. New York, N.Y. : The Academy. Annals of the New York Academy of Sciences. In the series analytic: Enzyme engineering 9 / edited by H.V. Blanch and A.M. Klibanov. 1988. v. 542. p. 153-158. Includes references. (NAL Call No.: DNAL 500 N484).

0828

**Loblolly seedling genotypic xylem pressure potential responses to cutting practices in the nursery.**

Kissee, K.K. Newton, R.J.; Carroll, L. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 311-316. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

0829

**Lodgepole pine ecosystems.**

BISNA. Fahey, T.J. Knight, D.H. Washington, D.C. : The Institute. BioScience - American Institute of Biological Sciences. Oct 1986. v. 36 (9). p. 610-617. ill. Includes references. (NAL Call No.: DNAL 500 AM322A).

0830

**Long-term effects of fertilization on stem form, growth relations, and yield estimates of slash pine.**

FDSCA. Jokela, E.J. Harding, R.B.; Nowak, C.A. Bethesda, Md. : Society of American Foresters. The long-term effects of time-of-planting phosphorus (P) fertilization on stem form were evaluated in a 25-year-old slash pine plantation in north Florida. Cylindrical form factor (CFF), relative taper curves, the constant-stress principle of stem formation, and individual tree volume and biomass estimation equations were compared among treatments. Significant differences in CFF and taper existed between control and fertilized trees. Treatment-induced changes in crown size and accelerated tree and stand development may be responsible for these differences. Although statistically significant, alteration of stem form by fertilization was of minor importance relative to the accurate estimation of stand volume and weight. The cost and effort necessary to develop treatment-specific equations for quantifying fertilizer responses for slash pine on P-deficient sites appears unwarranted. Forest science. Sept 1989. v. 35 (3). p. 832-842. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0831

**Long term effects of gibberellin and cytokinin on coconut trees.**

PRNCA. Fisher, J.B. Theobald, W.F. Lawrence, Kan. : The International Palm Society. Principes. Jan 1989. v. 33 (1). p. 5-17. ill. Includes references. (NAL Call No.: DNAL 80 P932).

0832

**Long-term ozone exposure affects winter hardiness of red spruce (*Picea rubens* Sarg.) seedlings.**

NEPHA. Fincher, J. Cumming, J.R.; Alscher, R.G.; Rubin, G.; Weinstein, L. New York, N.Y. : Cambridge University Press. The New phytologist. Sept 1989. v. 113 (1). p. 85-96. ill. Includes references. (NAL Call No.: DNAL 450 N42).

0833

**Manipulation of pine seedling physiology by water stress conditioning.**

Johnson, J.D. Seiler, J.R.; McNabb, K.L. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 290-302. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

0834

**Measurement of relative water content for various species by infrared reflectances.**

Hunt, E.R. Jr. Rock, B.N.; Nobel, P.S. Logan, Utah : Utah State University, 1987? . Proceedings of International Conference on Measurement of Soil and Plant Water Status : in commemoration of the centennial of Utah State University, July 6-10, 1987, Logan, Utah. v. 2 p. 9-11. Includes references. (NAL Call No.: DNAL QK870.I5 1987).

0835

**Measuring the internal pressure of maturing pecans.**

TAAEA. Allison, J.M. Jr. Prussia, S.E.; Daniell, J.W.; Tollner, E.W. St. Joseph, Mich. : The Society. Transactions of the ASAE - American Society of Agricultural Engineers. Nov/Dec 1987. v. 30 (6). p. 1869-1872. ill. Includes references. (NAL Call No.: DNAL 290.9 AM32T).



## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0836

### **Mechanism of water stress-induced xylem embolism.**

PLPHA. Sperry, J.S. Tyree, M.T. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Nov 1988. v. 88 (3). p. 581-587. ill. Includes references. (NAL Call No.: DNAL 450 P692).

0837

### **Mechanisms of early primary succession in subalpine habitats on Mount St. Helens.**

ECOLA. Wood, D.M. Del Moral, R. Tempe, Ariz. : Ecological Society of America. Ecology : a publication of the Ecological Society of America. Aug 1987. v. 68 (4). p. 780-790. Includes references. (NAL Call No.: DNAL 410 EC7).

0838

### **Methods for measuring water status and reducing transpirational water loss in trees.**

JOARD. Roberts, B.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Literature review. Feb 1987. v. 13 (2). p. 56-61. Includes references. (NAL Call No.: DNAL SB436.J6).

0839

### **Microbial inoculants for tissue-cultured ectomycorrhizal and actinorrhizal trees.**

Loree, M. Stowers, M.; Garton, S.; Wood, T. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 66-68. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0840

### **Microclimate modification in a jack pine seed orchard.**

Street, R.B. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. Prevention of contamination by windborne "foreign" pollen. p. 248-251. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

0841

### **Micropropagation of Eucalyptus cloning candidates in Florida.**

Howland, G.P. Meskimen, G.; Constantin, M.J. New York : Plenum Press, c1986. Biomass energy development / edited by Wayne H. Smith. Paper presented at the "Third Southern Biomass Energy Research Conference," March 12-14, 1985, Gainesville, Florida. p. 111-118. Includes references. (NAL Call No.: DNAL TP360.S68 1985).

0842

### **Modeling the effect of thinning on tree water use.**

Spittlehouse, D.L. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume sponsored by the American Meteorological Society. p. 256-258. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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### **Modeling the feasibility of free-air carbon dioxide releases for vegetation response research.**

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### **Modeling the total evaporation and water balance of a forest canopy.**

Chassagneux, P.G. Choisnel, E.M. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 263-264. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

0845

### **Modeling tree growth potential based on effective evapotranspiration.**

FOSCA. Wickramasinghe, A. Bethesda, Md. : Society of American Foresters. Annual tree growth potential is assessed by modeling effective evapotranspiration and taken as an index expressing interaction between atmospheric energy, potential evapotranspiration (PET), and soil moisture supply. The model has been calibrated for 11

forest stands of two evergreen species, Scots pine (*Pinus Sylvestris*) and Corsican pine (*Pinus Nigra*), located in England. Four calibrated effective evapotranspiration values (EET) together with a simple climatic index (PET/R), which expresses the balance between potential evapotranspiration and rainfall, were subsequently multiplied by tree age to incorporate the physiological efficiency of trees. The derived potential growth indexes (PGIs) were comparatively examined with actual annual tree growth data for a period of 30 to 40 years. Regression analysis was carried out in evaluating the model performance and the applicability of the model to predict environmental potential. All four predictions based on assessment of effective evapotranspiration were positively correlated with annual tree growth, having coefficients of determination above 0.40, and often reaching 0.70, with significance at the 0.001 level of probability. *FOR. SCI.* 34(4):864-881. *Forest science*. Dec 1988. v. 34 (4). p. 864-881. ill. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Modelling transpiration of subalpine trees in the central Rocky Mountains.**

Kaufmann, M.R. New York, N.Y. : ASCE, c1985. *Watershed management in the eighties : proceedings of a symposium, Denver, Colorado, April 30-May 1, 1985 / edited by E. Bruce Jones and Timothy J. Ward.* p. 61-68. Includes references. (NAL Call No.: DNAL TC423.W39 1985).

0847

**Monitoring cold hardiness of tree seedlings by infrared thermography.**

Laacke, R.J. Weatherspoon, C.P.; Tinus, R.W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 97-102. Includes references. (NAL Call No.: DNAL aSD11.A42).

0848

**Monitoring environmental impacts on forest ecosystems using spruce needles--investigations on representative sample collection programs.**

Peters, J. Maurer, W. Deerfield Beach, Fla. : VCH Publishers, c1985. *Air pollution and plants / edited by Clement Trojanowsky.* Presented at the 2nd "European Conference on Chemistry and the Environment," May 21-24, 1984, Lindau, West Germany. p. 217. (NAL Call No.: DNAL QK751.E97 1984).

0849

**Monitoring viability of overwintering container stock in the prairies--an overview of a five year lodgepole pine study.**

Dymock, I.J. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 96-105. Includes references. (NAL Call No.: DNAL aSD11.A42).

0850

**Morphological changes accompanying the transition from juvenile (atmospheric) to adult (tank) forms in the Mexican epiphyte tillandsia deppeana (Bromeliaceae).**

AJBOA. Adams, W.W. III. Martin, C.E. Baltimore, Md. : Botanical Society of America. *American journal of botany*. Aug 1986. v. 73 (8). p. 1207-1214. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0851

**Mount St. Helens ash: recreating its effects on the steppe environment and ecophysiology.**

ECOLA. Black, R.A. Mack, R.N. Tempe, Ariz. : Ecological Society of America. *Ecology* : a publication of the Ecological Society of America. Oct 1986. v. 67 (5). p. 1289-1302. Includes references. (NAL Call No.: DNAL 410 EC7).

0852

**Multiplicity of beta-1,4-xylanase in microorganisms: functions and applications.**

MBREDS. Wong, K.K.Y. Tan, L.U.L.; Saddler, J.N. Washington, D.C. : American Society for Microbiology. *Microbiological reviews*. Literature review. Sept 1988. v. 52 (3). p. 305-317. Includes references. (NAL Call No.: DNAL 448.3 B13).

0853

**Mycorrhiza and soil fertility effects with growth, nodulation and nitrogen fixation of *Leucaena* grown on a Typic Eutrastox.**

CSOSA2. Purcino, A.A.C. Lurlarp, C.; Lynd, J.Q. New York, N.Y. : Marcel Dekker. *Communications in soil science and plant analysis*. May 1986. v. 17 (5). p. 473-489. ill. Includes 16 references. (NAL Call No.: DNAL S590.C63).



## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0854

### **Mycorrhizae benefit plants under fertile conditions.**

ANURA. Verkade, S.D. Hamilton, D.F. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Dec 15, 1985. v. 162 (12). p. 67-71. Includes references. (NAL Call No.: DNAL 80 AM371).

0855

### **Mycorrhizal formation on containerized seedlings in the Intermountain Region.**

Kidd, F. Breuer, D.; Miller, D. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 218. ill. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0856

### **Mycorrhizal growth enhancement in Sitka spruce seedlings differs in nonsterile compared to sterilized soil.**

Walker, C. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 213. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0857

### **Mycorrhizal responsiveness of four cedar and redwood species of western North America.**

Kough, J.L. Molina, R.; Linderman, R.G. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 259. (NAL Call No.: DNAL aQK604.N6 1984).

0858

### **Mycosociological studies of mycorrhizal fungi in two loblolly pine plots in Mississippi and some relationships with remote sensing.**

Cibula, W.G. Ovrebo, C.L. Falls Church, VA : American Society for Photogrammetry and Remote Sensing, c1988. Remote sensing for resource inventory, planning and monitoring : the Second Forest Serv Remote Sensing Applications Conf, held at the Natl Space Technology Laboratories, MS and the Holiday Inn, Slidell, LA, Apr 11-15, 1988. p. 268-307. Includes references. (NAL

Call No.: DNAL SD387.R4F6 1988).

0859

### **The nature of waterlogging tolerance of loblolly pine.**

Hook, D.D. Shear, T. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 51-57. Includes references. (NAL Call No.: DNAL A99.9 F769).

0860

### **A network of high elevation conifers in the western U.S. for detection of tree-ring growth response to increasing atmospheric carbon dioxide.**

Graybill, D.A. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 463-474. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

0861

### **New analysis of branches, boles, and roots for predicting historical changes in photosynthesis, respiration, and carbon allocation below ground.**

Waring, R.H. Oren, R. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 1-5. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

0862

### **New interpretation of the inflorescence of Fagus drawn from the developmental study of Fagus crenata, with description of an extremely monstrous cupule.**

AJBOAA. Okamoto, M. Columbus, Ohio : Botanical Society of America. American journal of botany. Jan 1989. v. 76 (1). p. 14-22. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

0863

### **New silvicultural options for timber and water yield in the Rocky Mountains.**

Kaufmann, M.R. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. 1985. p. 237-242. Includes references. (NAL Call No.: DNAL SD143.S64).

0864

**A new tree biology facts, photos, and philosophies on trees and their problems and proper care /by Alex L. Shigo.**

Shigo, Alex L. Durham, NH : Shigo and Trees, Associates, c1986. xiv, 595 p. : ill. ; 24 cm. (NAL Call No.: DNAL SB761.S5).

0865

**Nickel toxicity in mycorrhizal birch seedlings infected with Lactarius rufus or Scleroderma flavidum. II. Uptake of nickel, calcium, magnesium phosphorus and iron.**

NEPHA. Jones, M.D. Hutchinson, T.C. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 461-470. Includes references. (NAL Call No.: DNAL 450 N42).

0866

**Nickel toxicity in mycorrhizal birch seedlings infected with Lactarius rufus or Scleroderma flavidum. I. Effects on growth, photosynthesis, respiration and transpiration.**

NEPHA. Jones, M.D. Hutchinson, T.C. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 451-459. Includes references. (NAL Call No.: DNAL 450 N42).

0867

**Nitrate reductase of primary roots of red spruce seedlings: effects of acidity and metal ions.**

PLPHA. Yandow, T.S. Klein, R.M. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. July 1986. v. 81 (3). p. 723-725. Includes 20 references. (NAL Call No.: DNAL 450 P692).

0868

**Nitrogen fertilisation and ectomycorrhizal formation of Pinus caribaea (Morelet) seedlings.**

Amakiri, M.A. Ojobo, L.I. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 339. ill. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0869

**Non-metabolic binding of aluminum to roots of loblolly pine and honeylocust.**

JPNUDS. Schaedle, M. Thornton, F.C.; Raynal, D.J. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Sept 1986. v. 9 (9). p. 1227-1238. Includes 20 references. (NAL Call No.: DNAL QK867.J67).

0870

**Non-uniform stomatal closure induced by water stress causes putative non-stomatal inhibition of photosynthesis.**

NEPHA. Downton, W.J.S. Loveys, B.R.; Grant, W.J.R. New York, N.Y. : Cambridge University Press. The New phytologist. Dec 1988. v. 110 (4). p. 503-509. ill. Includes references. (NAL Call No.: DNAL 450 N42).

0871

**Nursery and field evaluation of compost-grown coniferous seedlings.**

Coleman, M. Dunlap, J.; Dutton, D.; Bledsoe, C. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 24-28. Includes references. (NAL Call No.: DNAL aSD11.A42).

0872

**Nursery cultural practices affect field performance of longleaf pine.**

Hatchell, G.E. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 148-156. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

0873

**Nursery practices, seedling sizes, and field performance.**

Stein, W.I. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 15-18. ill. Includes references. (NAL Call No.: DNAL aSD11.A42).



## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0874

**Nutrient accumulations in pinyon-juniper ecosystems--managing for future site productivity.**

XGTIA. Tiedemann, A.R. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at a "Conference on Pinyon-Juniper," January 13-16, 1986, Reno, Nevada. Jan 1987. (215). p. 352-359. Includes references. (NAL Call No.: DNAL ASD11.A48).

0875

**Nutrient uptake and growth responses of Virginia pine to elevated atmospheric carbon dioxide.**

JEVQAA. Luxmoore, R.J. O'Neill, E.G.; Ellis, J.M.; Rogers, H.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. July/Sept 1986. v. 15 (3). p. 244-251. Includes references. (NAL Call No.: DNAL QH540.J6).

0876

**Oak stand growth on California's hardwood rangelands.**

CAGRA. Standiford, R.B. Howitt, R.E. Berkeley, Calif. : The Station. California agriculture - California Agricultural Experiment Station. July/Aug 1988. v. 42 (4). p. 23-24. maps. (NAL Call No.: DNAL 100 C12CAG).

0877

**Old-growth Douglas-fir and western hemlock: a 36-year record of growth and mortality.**

DeBell, D.S. Franklin, J.F. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Oct 1987. v. 2 (4). p. 111-114. ill. Includes references. (NAL Call No.: DNAL SD388.W6).

0878

**One-year results for a coastal British Columbia glyphosate conifer release trial.**

WSWPA. Reynolds, P.E. King, K.; Whitehead, R.; McKay, T.S. Reno : The Society. Proceedings - Western Society of Weed Science. Paper presented at the annual meeting of the Western Society of Weed Science, March 18-20, 1986, San Diego, California. 1986. v. 39. p. 107-117. Includes references. (NAL Call No.: DNAL 79.9 W52).

0879

**Osmotic adjustment in Pinus taeda families in response to water stress.**

Meier, C.E. Newton, R.J. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 110-117. Includes references. (NAL Call No.: DNAL A99.9 F769).

0880

**OSU vigor test: principles, procedures, and predictive ability.**

McCreary, D.D. Duryea, M.L. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. p. 85-92. Includes references. (NAL Call No.: DNAL SD404.E93).

0881

**Patterns of leader elongation in loblolly pine families.**

FOSCA. Bridgwater, F.E. Williams, C.G.; Campbell, R.G. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1985. v. 31 (4). p. 933-944. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0882

**Patterns of leaf area distribution within crowns of nitrogen- and phosphorus-fertilized loblolly pine trees.**

FOSCA. Vose, J.M. Bethesda, Md. : Society of American Foresters. Field trials of nitrogen (N) and phosphorus (P) fertilization in loblolly pine plantations (*Pinus taeda* L.) were used to determine the effects of fertilization on within-crown leaf area distribution in a fully stocked stand, and two less than fully stocked stands. A second objective was to examine the utility of the Weibull distribution for modeling leaf area distribution in loblolly pine crowns. Results showed that leaf area increases were most evident in the mid- and lower-crown positions (2-4 m and 4-6 m crown depths), regardless of stocking level. Response patterns suggested that the Westvaco Stocking Chart, which is based on empirical relationships between stand basal area, stand density, and canopy closure, did not adequately reflect light interception in these stands because stands were ranked differently when stocking was expressed by stand leaf area index. The fully stocked stand was 50% below the theoretical optimum leaf area index value of 5. Thus, it is hypothesized that leaf area increases occurred in the mid- and lower-crown because shading in the mid- and lower-crown positions was insufficient to inhibit foliage production and survival. Fertilization-induced changes in leaf physiology may have also played an important role in leaf production and branch

retention in the mid- and lower-crown. The Weibull distribution provided a good fit of within-crown leaf area distribution. For. Sci. 34(3): 564-573. Forest science. Sept 1988. p. 564-573. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0883

**Paulownia: potential tree crop, 1970-1987.**  
Brownlee, E. Beltsville, Md. : The Library. Quick bibliography series - National Agricultural Library (U.S.). Bibliography. Dec 1987. (88-11). 17 p. (NAL Call No.: DNAL a25071.N3).

0884

**Performance of ectomycorrhizal Sitka spruce seedlings outplanted in SE Alaska.**  
Shaw, C.G. III. Sidle, R.C. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 216. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0885

**Performance of range-wide provenances of northern white-cedar in three central Illinois plantations over a 20-year period.**  
Jokela, J.J. Savka, M.A. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 107-111. Includes references. (NAL Call No.: DNAL SD399.5.N6).

0886

**Phenological and morphological responses of mesic and dry site sources of coastal Douglas-fir to water deficit.**  
FOSCA. Joly, R.J. Adams, W.T.; Stafford, S.G. Bethesda, Md. : Society of American Foresters. Patterns of genetic variation in morphological and phenological responses to water deficit are described in seedling progeny of four populations of coastal Douglas-fir (*Pseudotsuga menziesii* Mirb. Franco var. *menziesii*), sampled from coastal and inland sites in Oregon. Progeny of coastal and inland populations differed for all traits measured, and differences appear to reflect adaptation to the source environment. Inland populations were characterized by early budset, slower rates of shoot extension, and higher root-shoot ratios. A significant fraction of total variability was attributable to differences among families within populations. Little evidence for irrigation x population interaction was found when seedling traits were examined singly. Of

16 traits analyzed, only average daily rate of growth and seedling height had significant interaction terms. Interactions between irrigation and families-within-population were more prevalent. A canonical discriminant analysis was used to identify a subset of variables that best reveals differences among progeny of coastal and inland populations. Implications for seed transfer and for selection and breeding of genotypes suitable for xeric environments are discussed. Forest science. Dec 1989. v. 35 (4). p. 987-1005. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0887

**Phosphatase and nitrate reductase activities of *Pisolithus tinctorius*: intraspecific variation and ecological inferences.**  
Ho, I. Trappe, J.M. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 353. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

0888

**A photographic system for measuring shoot elongation in tree seedlings and relation to solar radiation and temperature.**  
GROWA. Kanninen, M. Pohja, T.; Siivola, E. Lakeland, Fla. : Growth Publishing. Growth. Spring 1985. v. 49 (1). p. 44-50. ill. Includes references. (NAL Call No.: DNAL 442.8 G91).

0889

**A photographic technique for estimating browse growth and use.**  
WLSBA. Krebs, C.J. Sinclair, A.R.E.; Boonstra, R.; Smith, J.N.M. Bethesda, Md. : The Society. Wildlife Society bulletin. Fall 1986. v. 14 (3). p. 286-288. ill. Includes references. (NAL Call No.: DNAL SK357.A1W5).

0890

**Photosynthesis and growth response of red spruce and loblolly pine to soil-applied lead and simulated acid rain.**  
FOSCA. Seiler, J.R. Paganelli, D.J. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1987. v. 33 (3). p. 668-675. Includes references. (NAL Call No.: DNAL 99.8 F7632).



## (PLANT PHYSIOLOGY AND BIOCHEMISTRY)

0891

**Photosynthesis and transpiration of loblolly pine seedlings as influenced by moisture-stress conditioning.**

FDSCA. Seiler, J.R. Johnson, J.D. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 742-749. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0892

**Photosynthesis decrease and stomatal control of gas exchange in *Abies alba* Mill. in response to vapor pressure difference.**

PLPHA. Guehl, J.M. Aussenac, G. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Feb 1987. v. 83 (2). p. 316-322. Includes references. (NAL Call No.: DNAL 450 P692).

0893

**Photosynthesis, water relations, and drought adaptation in six woody species of oak-hickory forests in central Missouri.**

FDSCA. Bahari, Z.A. Pallardy, S.G.; Parker, W.C. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 557-569. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0894

**Photosynthetic life span of attached poplar leaves under favorable controlled environmental conditions.**

FDSCA. Nelson, N.D. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 700-705. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0895

**Photosynthetic response of yellow-poplar seedlings to the antioxidant chemical ethylenediurea.**

JOARD. Roberts, B.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. June 1987. v. 13 (6). p. 154-158. Includes references. (NAL Call No.: DNAL SB436.J6).

0896

**Physical aspects of freezing in black oak acorns.**

Boese, S.R. George, M.F.; Mitchell, R.J.; Martin, U.; McQuilkin, R.A. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign,

Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 222-227. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

0897

**Physiological and morphological responses of three half-sib families of loblolly pine to water-stress conditioning.**

FDSCA. Seiler, J.R. Johnson, J.D. Bethesda, Md. : Society of American Foresters. Abstract: The effect of water-stress conditioning on drought tolerance of three open-pollinated families of loblolly pine (*Pinus taeda* L.) during water stress was investigated. Seedlings were subjected to one of two levels of prolonged, sublethal drought or were kept well watered. After the conditioning period, photosynthesis, transpiration, and growth were evaluated. Photosynthesis was decreased greatly with reduced needle water potential. Conditioned seedlings generally maintained positive net photosynthesis to water potentials 0.15 (moderate water-stress conditioning) and 0.40 (severe water-stress conditioning) MPa lower than those of control seedlings. This response was likely the result of an acclimation of the photosynthetic process resulting in less nonstomatal inhibition of photosynthesis at low needle water potentials. Under well-watered conditions, transpiration, but not photosynthesis, was reduced greatly by the conditioning treatments and resulted in improved water-use efficiency. Root growth was affected more by water stress than shoot growth, causing a decrease in root/shoot ratio. Genetic differences in photosynthetic acclimation were not apparent. However, compared to seedlings representing two Virginia seed sources, a family from Texas, known for its superior drought tolerance, had the lowest root/shoot ratio and the least change in transpiration in response to water-stress conditioning. FOR. SCI. 34(2):487-495. Forest science. June 1988. v. 34 (2). p. 487-495. Includes references. (NAL Call No.: DNAL 99.8 F7632).

0898

**Physiological characteristics of a non-degradative isolate of *Postia* (=Poria) placenta.**

MYCOAE. Micales, J.A. Highley, T.L. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Mar/Apr 1989. v. 81 (2). p. 205-215. ill. Includes references. (NAL Call No.: DNAL 450 M99).

0899

**Physiological characteristics of loblolly pine seedlings in relation to field performance.**

Kramer, P.J. Rose, R.W. Jr. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management

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Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 416-440. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

### 0900

**Physiological responses of deciduous tree root collar drenched with flurprimidol.**

JOARD. Sterrett, J.P. Tworowski, T.J.; Kujawski, P.T. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. May 1989. v. 15 (5). p. 120-124. Includes references. (NAL Call No.: DNAL SB436.U6).

### 0901

**Physiological responses of shade trees treated with flurprimidol at three growth stages.**

PPGGD. Sterrett, J.P. Tworowski, T.J.; Kujawski, P.T. Lake Alfred, Fla. : The Society. Proceedings of the Plant Growth Regulator Society of America. Includes abstract. 1988. (15th). p. 173. (NAL Call No.: DNAL SB128.P5).

### 0902

**Physiological responses of trees to mechanical perturbation: implication for genetic evaluation for wind tolerance.**

Telewski, F.W. Bozeman, Mont. : Montana State University, Cooperative Extension Service. Great Plains Agriculture i.e. Agricultural Council publication. Paper presented at the "International Symposium on Windbreak Technology," June 23-27, 1986, Lincoln, Nebraska. 1986. (117). p. 251-252. Includes references. (NAL Call No.: DNAL S27.A3).

### 0903

**Physiological responses to thinning in eight-year-old loblolly pine stands on the Virginia Piedmont.**

Ginn, S.E. Seiler, J.R.; Cazell, B.H.; Kreb, R.E. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 67-73. Includes references. (NAL Call No.: DNAL aSD11.U57).

### 0904

**Physiology of southern pine seedlings.**

Cannell, M.G.R. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p.

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**Pine growth reductions in the Southeast /Raymond M. Sheffield ... et al. . --.**

Sheffield, Raymond M. Asheville, NC : U.S. Dept. of Agriculture, Forest Service, Southeastern Forest Experiment Station, 1985. "November 1985"--p. 2 of cover. iii, 112 p. : ill. ; 28 cm. --. Bibliography: p. 36. (NAL Call No.: DNAL A99.9 F7623Ub no.83).

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**Pinosylvin and pinosylvin methyl ether as feeding deterrents in green alder.**

JCECD. Clausen, T.P. Reichardt, P.B.; Bryant, J.P. New York, N.Y. : Plenum Press. Journal of chemical ecology. Dec 1986. v. 12 (12). p. 2117-2131. Includes references. (NAL Call No.: DNAL QD415.A1U6).

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**Pinyon trees (Pinus edulis) remeasured after 47 years.**

XGTIA. Little, E.L. Jr. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at a "Conference on Pinyon-Juniper," January 13-16, 1986, Reno, Nevada. Jan 1987. (215). p. 65-68. Includes references. (NAL Call No.: DNAL aSD11.A48).

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XGTIA. Sosebee, R.E. Wan, C. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at a "Symposium on Shrub Ecophysiology and Biotechnology," June 30-July 2, 1987, Logan, Utah. Feb 1989. (256). p. 103-118. Includes references. (NAL Call No.: DNAL aSD11.A48).

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### **Plant growth regulator-directed phase specificity in cell and tissue culture for tree improvement.**

Durzan, D.J. Bethesda, Md. : The Society. Proceedings of the...Society of American Foresters National Convention. 1986. p. 218-222. ill. Includes references. (NAL Call No.: DNAL SD143.S64).

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### **Plant-water relationships and growth of black walnut in a walnut-forage multicropping regime.**

FOSCA. Dey, D. Conway, M.R.; Garrett, H.E.; Hinckley, T.S.; Cox, G.S. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1987. v. 33 (1). p. 70-80. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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AJBDAA. Sacchi, C.F. Price, P.W. Columbus, Ohio : Botanical Society of America. American journal of botany. Sept 1988. v. 75 (9). p. 1387-1393. Includes references. (NAL Call No.: DNAL 450 AM36).

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PNGOA. Mehlenbacher, S.A. Miller, A.N. Tigard, Or. : The Society. Proceedings of the Nut Growers Society of Oregon, Washington & British Columbia. Meeting held on January 27, 1988, Portland, Oregon. 1988. (73rd). p. 67-71, 73-75, 77-78, 80-81. Includes references. (NAL Call No.: DNAL 94.69 W52).

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### **Potential for use of cottonwoods as indicators of past floods.**

Clark, S. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p.

243-248. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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### **Potential in using elemental concentrations in radial increments of old growth eastern redcedar to examine the chemical history of the environment.**

Guyette, R. McGinnes, E.A. Jr. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 671-680. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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### **Predicting tree survival and growth from minesoil analysis.**

Davidson, W.H. Bethesda, Md. : The Society. Proceedings of the...Society of American Foresters National Convention. 1986. p. 244-246. (NAL Call No.: DNAL SD143.S64).

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Scarscia-Mugnozza, G. Valentini, R. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 265-266. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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### **Production and utilization of herbaceous plants in small clearcuts in an Arizona mixed conifer forest.**

XARRA. Ffolliott, P.F. Gottfried, G.J. Fort Collins, Colo. : The Station. Research note RM - U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. Oct 1989. (494). 6 p. ill.

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APMBA. Jager, Z. Croan, S.; Kirk, T.K. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. Nov 1985. v. 50 (5). p. 1274-1278. Includes 14 references. (NAL Call No.: DNAL 448.3 AP5).

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Burns, L.A. Gainesville, Fla. : University Presses of Florida, 1986. c1984. Cypress swamps / Katherine Carter Ewel and Howard T. Odum, editors. p. 318-333. maps. (NAL Call No.: DNAL QH541.5.C95C9).

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**Radial variation of collapse, volumetric shrinkage, moisture content and density in *Eucalyptus regnans* F. Muell.**

WOSTBE. Chafe, S.C. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1986. v. 20 (3). p. 253-262. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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**Radiodensitometric tree-ring analysis along altitudinal gradients: some alternative procedures for detecting site, climatic, and potential CO2 effects on tree growth.**

Kienast, F. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 452-462. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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JRMGA. Thurow, T.L. Blackburn, W.H.; Warren, S.D.; Taylor, C.A. Jr. Denver, Colo. : Society for Range Management. Journal of range management. Sept 1987. v. 40 (5). p. 455-460. Includes references. (NAL Call No.: DNAL 60.18 J82).

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AMNTA. Fowler, S.V. Lawton, J.H. Chicago, Ill. : University of Chicago Press. The American naturalist. Literature review. Aug 1985. v. 126 (2). p. 181-195. Includes references. (NAL Call No.: DNAL 470 AM36).

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**Ratio and regression estimators of hardwood growth for comparing efficacy of herbicide treatments.**

Knowe, S.A. Shiver, B.D. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 353-357. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Recent abnormal increase in tree-ring widths: a possible effect of elevated atmospheric carbon dioxide.**

Parker, M.L. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 511-521. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**Red spruce rhizosphere dynamics: spatial distribution of aluminum and zinc in the near-root soil zone.**

FDSCA. Smith, W.H. Pooley, A.S. Bethesda, Md. : Society of American Foresters. Red spruce roots, associated with mature, healthy trees occupying canopy positions, were located in three 8.5 m<sup>2</sup> forest floor plots at 250 m elevation in the Hubbard Brook Experimental Forest, White Mountain National Forest, New Hampshire. Roots, 0.25-1.0 cm diam, were severed, and cut ends were placed in soil in plastic bags. In 14 months, new roots developed behind cut ends and were cultured in wooden trays containing screened forest floor material. Forest floor concentrations of aluminum, calcium, chlorine, iron, lead, and zinc were established. Trays containing roots were supplied with a distilled water treatment or with distilled water containing chloride salts of aluminum, lead or zinc sufficient to increase substrate cation concentration by 500 ppm. Eight weeks following treatment, roots (largely ectomycorrhizal, diam 0.4-1.0 mm) with associated rhizosphere soil were harvested by impregnating specimens in agar and freezing in liquid nitrogen. Cross sections of root-rhizosphere soil samples were freeze dried



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and examined with a scanning electron microscope and energy dispersive x-ray spectrometer. Gradients of element concentrations were established along transects from root interiors (cortex) through the inner and outer rhizosphere zones (2 mm from root) and in bulk soil (devoid of roots). The pH of rhizosphere soil was approximately 0.5 unit less than bulk soil. Aluminum concentrations exhibited a strongly descending gradient from bulk soil through the rhizosphere to the root. Estimated concentrations ranged from 1000 ppm within 200 microns of the root to 10 x this amount in soil beyond 2000 microns. Calcium distribution, without aluminum amendment, was relatively constant through the rhizosphere, but with aluminum amendment, calcium exhibited a sharply decreasing gradient near the root. In the unamended treatment, the Al:Ca ratio dropped from 7 to 0.2 across the rhizosphere. Chlorine was constant in the rhizosphere but exhibited pronounced accumulation in. Forest science. Dec 1989. v. 35 (4). p. 1114-1124. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Conkey, L.E. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 382-391. Includes references. (NAL Call No.: DNAL QK477.2.A615 1986).

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**Reduction of survival and growth of young *Pinus jeffreyi* by an herbaceous perennial, *Wyethia mollis*.**  
AMNAA. Parker, V.T. Yoder-Williams, M.P. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1989. v. 121 (1). p. 105-111. Includes references. (NAL Call No.: DNAL 410 M58).

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**Reexamination of pore water sulfide concentrations and redox potentials near the aerial roots of *Rhizophora mangle* and *Avicennia germinans*.**  
AJBOAA. McKee, K.L. Mendelssohn, I.A.; Hester, M.W. Columbus, Ohio : Botanical Society of America. American journal of botany. Sept 1988. v. 75 (9). p. 1352-1359. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

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**Regeneration of shoots from leaf disk explants of black locust, *Robinia pseudoacacia* L.**  
Davis, J.M. Keathley, D.E. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 29-34. Includes references. (NAL Call No.: DNAL SD399.5.N6).

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**Relation between cold hardiness, root growth capacity, and bud dormancy in three western conifers.**  
Tinus, R.W. Burr, K.E.; Wallner, S.U.; King, R.M. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 80-86. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Relationship between initial seedling height and survival and growth of loblolly pine seedlings planted during a droughty year.**  
SJAFD. Tuttle, C.L. South, D.B.; Golden, M.S.; Meldahl, R.S. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1987. v. 11 (3). p. 139-143. Includes references. (NAL Call No.: DNAL SD1.S63).

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**The relationship between tree diameter growth and climate in the Lake States.**  
XFGTA. Holdaway, M.R. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the "Conference on Forest Growth Modelling and Prediction," Aug 23-27, 1987, Minneapolis, Minnesota. 1988. (120). p. 490-497. Includes references. (NAL Call No.: DNAL aSD11.A352).

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**Relationship between volume and biomass of early successional vegetation and the prediction of loblolly pine seedling growth.**  
FOSCA. Byrne, S.V. Wentworth, T.R. Bethesda, Md. : Society of American Foresters. A simple and nondestructive method of measuring plant volume was developed to test the following two hypotheses: (1) plant volume is an effective substitute for plant biomass in the prediction of competitive potential; and (2) the plant biomass-volume relationship is affected by plant growth form. In 1983, above-ground volume

and biomass were determined for all plants in 40 1-m<sup>2</sup> plots in an experimental loblolly pine (*Pinus taeda* L.) plantation having varying degrees of successional regrowth. After natural log transformations of plant biomass and volume, separate regression equations were developed for grass, forb, shrub, and tree growth forms. A test of homogeneity indicated that the slopes and intercepts for the four regression equations were not all identical. Specific contrasts among the regression equations were also tested for common slopes and intercepts to determine the source of overall significance. Results of the contrasts were explained by differences in plant allocation patterns. The variation in plant biomass accounted for by the volume models ranged from 78% for grasses to 94% for trees. As an application of this approach, volume was measured and biomass was estimated from the regression equations for successional plants within a 2m radius (the "neighborhood") of each of 69 loblolly pine seedlings. Total plant volume and total estimated biomass each accounted for approximately 40% of the variation in pine growth. *FOR. SCI.* 34(4):939-947. *Forest science*. Dec 1988. v. 34 (4). p. 939-947. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Pellett, H. Vogel, K.; McNamara, S.; Zuzek, K. Washington, D.C. : Horticultural Research Institute. *Journal of environmental horticulture*. June 1988. v. 6 (2). p. 48-52. ill. Includes references. (NAL Call No.: DNAL SB1.J66).

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**Reproduction in *Polemonium*: patterns and implications of floral nectar protection and standing crops.**

AJBOA. Zimmerman, M. Pyke, G.H. Baltimore, Md. : Botanical Society of America. *American journal of botany*. Oct 1986. v. 73 (10). p. 1405-1415. Includes references. (NAL Call No.: DNAL 450 AM36).

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PLPHA. Johnson, R.W. Tyree, M.T.; Dixon, M.A. Rockville, Md. : American Society of Plant Physiologists. *Plant physiology*. June 1987. v. 84 (2). p. 495-500. ill. Includes references. (NAL Call No.: DNAL 450 P692).

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XGTIA. McCaughey, W.W. Ferguson, D.E. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT.~ Literature review. Apr 1988. (243). p. 255-266. Includes references. (NAL Call No.: DNAL aSD11.A48).

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**Response of *Hamamelis virginiana* L. to canopy gaps in a Pennsylvania oak forest.**

AMNAA. Hicks, D.J. Hustin, D.L. Notre Dame, Ind. : University of Notre Dame. *American midland naturalist*. Jan 1989. v. 121 (1). p. 200-204. Includes references. (NAL Call No.: DNAL 410 M58).

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AMNAA. Collins, B.S. Pickett, S.T.A. Notre Dame, Ind. : University of Notre Dame. *American midland naturalist*. Apr 1988. v. 119 (2). p. 282-290. Includes references. (NAL Call No.: DNAL 410 M58).

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CSTNA. Milton, N.M. Purdy, T.L. Morgantown, W.Va. : Southern Appalachian Botanical Club. *Castanea*. Sept 1988. v. 53 (3). p. 207-214. maps. Includes references. (NAL Call No.: DNAL 450 S082).

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**Response of *Sitanion hystrix* (Nutt.) J. G. to prescribed burning.**

AMNAA. Young, R.P. Miller, R.F. Notre Dame, Ind. : University of Notre Dame. *American midland naturalist*. Jan 1985. v. 113 (1). p. 182-187. Includes references. (NAL Call No.: DNAL 410 M58).



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**Response of tree growth to changes in flooding regime in a mixed hardwood bottomland forest in southern Illinois.**

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**Response of woody swamp seedlings to flooding and increased water temperatures. I. Growth, biomass, and survivorship.**

AJBOAA. Donovan, L.A. McLeod, K.W.; Sherrod, K.C. Jr.; Stumpff, N.J. Columbus, Ohio : Botanical Society of America. American journal of botany. Aug 1988. v. 75 (8). p. 1181-1190. Includes references. (NAL Call No.: DNAL 450 AM36).

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**Response to removal of competing vegetation in slash pine plantations.**

SWSPBE. Rheney, J.W. Shiver, B.D.; Pienaar, L.V. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 246-252. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Responses of cherrybark oak seedlings to short-term flooding.**

FOSCA. Pezeshki, S.R. Chambers, J.L. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 760-771. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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FOSCA. Simini, M. Leone, I.A. Washington, D.C. : Society of American Foresters. Forest science. June 1986. v. 32 (2). p. 487-492. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Zaerr, J.B. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. p. 137-141. Includes references. (NAL Call No.: DNAL SD404.E93).

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D'Arrigo, R. Jacoby, G.C.; Fung, I.Y. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 475-484. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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Coleman, M.E. Anderson, A.J. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 361-362. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

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**Role of forest fires in germination of seeds dormant in the soil.**

SJECAL. Komarova, T.A. New York, N.Y. : Consultants Bureau. The Soviet journal of ecology. Translated from: Ekologiya, p. 3-8. (QH540.E3). Nov/Dec 1985 (pub. 1986). v. 16 (6). p. 311-315. Includes references. (NAL Call No.: DNAL QH540.E32).

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**The role of proteins in the nitrogen nutrition of ectomycorrhizal plants. V. Nitrogen transfer in birch (*Betula pendula*) grown in association with mycorrhizal and non-mycorrhizal fungi.**

NEPHA. Abuzinadah, R.A. Read, D.J. New York, N.Y. : Cambridge University Press. The New phytologist. May 1989. v. 112 (1). p. 61-68. Includes references. (NAL Call No.: DNAL 450 N42).

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**The role of resin acids in the relationship between Scots pine and the sawfly, *Diprion pini* (Hymenoptera: Diprionidae). II. Correlations with the biology of *Diprion pini*.**  
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Buratti, L. Allais, J.P.; Barbier, M. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 171-187. Includes references. (NAL Call No.: DNAL SB761.M46).

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**Root containerization for physiological studies of shrubs and trees on rangeland.**  
JRMGA. Ansley, R.U. Jacoby, P.W.; Lawrence, B.K. Denver, Colo. : Society for Range Management. Journal of range management. Jan 1988. v. 41 (1). p. 90-91. ill. Includes references. (NAL Call No.: DNAL 60.18 J82).

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Simpson, D.G. Vyse, A.; Thompson, C.F. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 119-121. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Root Growth Capacity System.**  
Hileman, G.R. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 75-76. ill. (NAL Call No.: DNAL aSD11.A42).

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**Root growth of black walnut trees related to soil temperature, soil water potential, and leaf water potential.**  
FOSCA. Khuns, M.R. Garrett, H.E.; Teskey, R.O.; Hinckley, T.M. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 617-629. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Root growth potential and carbohydrate shifts in previously cold stored loblolly pine seedlings grown in hydroponic culture.**  
Rose, R.W. Whiles, R.P. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 25-33. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Root growth potential as an indicator of outplanting performance: problems and perspectives.**  
Landis, T.D. Skakel, S.G. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 106-110. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Root growth potential: facts, myths, value?.**  
Binder, W.D. Scagel, R.K.; Krumlik, G.J. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 111-118. ill.



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**Root growth potential, first-year survival, and growth of shortleaf pine seedlings show effects of lift date, storage, and family.**

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is to discuss sources of variation in osmotic  
potentials (psi pi), with special reference to  
North American tree species. Lowering of  
osmotic potentials by solute accumulation  
(osmotic adjustment) has been reported in a  
wide variety of tree species during drought,  
but not in all species. Osmotic potentials at  
zero turgor for 37 tree species throughout the  
United States and Canada averaged (+/- s.e.)  
-2.06 +/- 0.13 MPa and -2.54 +/- 0.06 MPa for  
leaves or shoots under moist and dry  
conditions, respectively. The low standard  
error associated with the mean values suggest  
that, as a group, North American trees develop  
fairly similar osmotic potentials for a range  
of moisture conditions. Substantial solute  
accumulation often routinely occurs in  
developing leaves and in over-wintering leaves.  
Drought preconditioning can increase  
physiological activity in plants during  
subsequent drought by lowering psi pi. However,  
if drought is imposed too rapidly osmotic



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adjustment may not occur. Physiological plasticity in trees may cause variations in psi in responses to light regime and leaf canopy position. Light and nutrient regimes that promote high net photosynthesis should also promote the ability to osmotically adjust. However, stomatal responses and growth during water and nutrient stress may be unrelated to osmotic potentials because of species differences in rooting and water transport, guard cell turgor not being closely coupled with that of the bulk leaf, and changes in plant growth regulator concentrations. When examining changes in osmotic potentials using pressure-volume curves, it is important to rehydrate plant material to a water potential characteristic for that species at full hydration in the field. Moreover, as with most physiological measurements, sampling variation in light regime, canopy position, nutrient status, temperature, age, phenology, drought history, and diurnal timing of harvesting of the leaves and shoots should be minimized. Forest science. Dec 1988. v. 34 (4). p. 1030-1046. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Survival and growth of Nuttall oak seedlings following selection cutting--28-year remeasurement.**

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NOSCA. Zobel, D.B. Antos, J.A. Pullman, Wash. : Washington State University Press. Northwest science. Feb 1987. v. 61 (1). p. 20-22. Includes references. (NAL Call No.: DNAL 470 N81).

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### **The symbiosis *Rhizobium-glomus* in *Leucaena leucocephala*.**

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### **Techniques for determining seedling water status and their effectiveness in assessing stress.**

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### **Temporary disturbance of translocation of assimilates in Douglas firs caused by low levels of ozone and sulfur dioxide.**

PLPHA. Gorissen, A. Veen, J.A. van. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Nov 1988. v. 88 (3). p. 559-563. Includes references. (NAL Call No.: DNAL 450 P692).

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Cheniclet, C. Bernard-Dagan, C.; Pauly, G. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 117-130. ill. Includes references. (NAL Call No.: DNAL SB761.M46).

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### **Thermal damage to chloroplast envelope membranes.**

PLPHA. McCain, D.C. Croxdale, J.; Markley, J.L. Rockville, Md. : American Society of Plant Physiologists. Nuclear magnetic resonance was used to detect thermal injury to chloroplasts in vivo. A lesion occurs in the chloroplast envelope membrane at temperatures between 53 degrees C and 57 degrees C, depending on species, leaf condition, and heating rate. The injury is associated with a sudden loss of water from the chloroplast. Plant physiology. June 1989. v. 90 (2). p. 606-609. Includes references. (NAL Call No.: DNAL 450 P692).

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JTBIDS. Donovan, L.A. Stumpff, N.J.; McLeod, K.W. Elmsford, N.Y. : Pergamon Press. Journal of thermal biology. July 1989. v. 14 (3). p. 147-154. Includes references. (NAL Call No.: DNAL QP82.2.T4J6).

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**Thinning red alder: effects of method and spacing.**

FOSCA. Hibbs, D.E. Emmingham, W.H.; Bondi, M.C. Bethesda, Md. : Society of American Foresters. A 14-year-old fully stocked red alder (*Alnus rubra* Bong.) stand on a site index 30 m (50 yr) site in northwest Oregon was precommercially thinned and growth measured for 5 years. Treatments were (1) 4.3 X 4.3 m in spacing (541 trees/ha), chemically thinned, (2) 6.1 X 6.1 m spacing (269 trees/ha), chemically thinned, (3) 6.1 X 6.1 m spacing, chain-saw thinned, and (4) control (1754 trees/ha). Chemical thinning was done by trunk injection of 2,4-D and caused some damage (flashback) to neighboring crop trees. Thinning increased individual-tree radial growth 49% to 100% and decreased tree height growth by as much as 56%. In combination, this resulted in no significant change in tree volume growth with thinning. The lack of tree volume growth increase combined with the decrease in stem density with thinning produced a net decrease in stand volume growth with thinning. A review of the literature showed height growth reductions to be common among other alder studies. Tree basal area growth on the chemically thinned plots did not increase as much as on the chain-saw thinned plots, suggesting a prolonged growth reduction effect from the herbicide treatment. Diameter growth decreased with increasing degree of herbicide-induced crown damage. Thinning increased the size but not the numbers of epicormic branches. The longevity or effects on wood quality of these branches is not known. Forest science. Mar 1989. v. 35 (1). p. 16-29. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Gillespie, A.R. Hocker, H.W. Jr. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Dec. 1986. v. 3 (4). p. 148-150. Includes references. (NAL Call No.: DNAL SD143.N6).

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**Thinning stagnated ponderosa and jeffrey pine stands in northeastern California: 30-year effects.**

Liliehalm, R.J. Teeguarden, D.E.; Gordon, D.T. Berkeley, Calif. : The Station. Research note PSW - U.S. Department of Agriculture, Forest

Service, Pacific Southwest Forest and Range Experiment Station. July 1989. (407). 6 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7652).

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**Three-dimensional forest growth model relating tree size, tree number, and stand age: relation to previous growth models and to self-thinning.** FOSCA. McFadden, G. Oliver, C.D. Bethesda, Md. : Society of American Foresters. A generalized three-dimensional model for tree growth containing tree size, number of trees per area, and stand age on the three axes can be shown to incorporate three previous models in the theoretical absence of differentiation and self-thinning. The previous models, each incorporating two of the three axes, are: the sigmoid growth models of tree size/stand age; the relation of tree size (volume or diameter)/tree number; and the reverse-J-shaped mortality relation of maximum tree number/stand age. Information developed from one two-dimensional model can be transferred to the other models using the three-dimensional response surface to interpret the growth trajectory of stands undergoing differentiation and self-thinning. For. Sci. 34(3):662-676. Forest science. Sept 1988. p. 662-676. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Three-dimensional representation of Douglas-fir volume growth: comparison of growth and yield models with stand data.**

FOSCA. O'Hara, K.L. Oliver, C.D. Bethesda, Md. : Society of American Foresters. Growth and yield estimates for unthinned stands from the Douglas-fir Stand Simulator (DFSIM; Curtis et al. 1981) and the Tree and Stand Simulator (TASS; Mitchell and Cameron 1985) were used to construct graphical three-dimensional representations of Douglas-fir (*Pseudotsuga menziesii* Mirb. Franco) stand growth on site index 44 meter (50 year). The three-dimensional models used three variables: trees per hectare, breast height age, and either mean tree volume or stand volume. The TASS and DFSIM models were in agreement over most of their common range of age and number of trees. At wider spacings and older ages, however, the volumes predicted by the DFSIM model exceeded those predicted by the TASS model by as much as 25%. Comparisons of these three-dimensional models to unthinned and thinned stand data from a similar site quality found the models to be reasonably accurate representations of unthinned stand growth. The thinned stands, however, had greater mean tree and stand volumes than those indicated by the TASS model for unthinned stands at similar spacings. Complete comparisons were not possible with the DFSIM model because of its limited range of number of trees. These results suggest the TASS model, and to a lesser extent, the DFSIM model may be underestimating the growth of widely spaced stands, or thinning may actually increase the growth of thinned trees over that of trees which had always grown at



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### **Timber productivity of seven forest ecosystems in southeastern Alaska.**

XFPNA. Van Hees, W.W.S. Portland, Or. : The Station. USDA Forest Service research paper PNW-RP - United States, Pacific Northwest Research Station. Mar 1988. (391). 10 p. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

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### **Time-dependent responses of trees to weather variations: an application of the Kalman filter.**

Visser, H. Molenaar, J. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 579-590. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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### **Tolerance of seedlings of Ponderosa pine, Douglas-fir, Grand fir, and Engelmann spruce for high temperatures.**

NOSCA. Seidel, K.W. Pullman, Wash. : Washington State University Press. Northwest science. Feb 1986. v. 60 (1). p. 1-7. ill. Includes references. (NAL Call No.: DNAL 470 N81).

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### **Topographic position effects on growth depression of California Sierra Nevada pines during the 1982-83 El Nino.**

ATLPA. Armstrong, J.K. Williams, K.; Huenneke, L.F.; Mooney, H.A. Boulder, Colo. : Institute of Arctic and Alpine Research, University of Colorado. Arctic and alpine research. Aug 1988. v. 20 (3). p. 352-357. Includes references. (NAL Call No.: DNAL GB395.A73).

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### **Trace metal uptake and accumulation in trees as affected by environmental pollution /C.F. Baes and S.B. McLaughlin.**

Baes, Charles F., 1924-. McLaughlin, Samuel B. Oak Ridge, Tenn. : Environmental Sciences Division, Oak Ridge National Laboratory, 1985. Caption title. ~ "Conf-8505156--3." ~ "DE86 O11078." ~ "Publication 2571.". 14, 5 p. : ill. Bibliography: leaves 12-14. (NAL Call No.: DNAL SB765.B3).

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### **Transplanting stress in bareroot conifer seedlings: its development and progression to establishment.**

Rietveld, W.J. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Sept 1989. v. 6 (3). p. 99-107. ill. Includes references. (NAL Call No.: DNAL SD143.N6).

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### **Tree energy systems.**

JOARD. Osssenbruggen, H.S. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Mar 1989. v. 15 (3). p. 53-58. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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### **Tree roots: where are they?.**

McDaniel, A.R. Overland Park, Kan. : Intertec Publishing Corporation. Grounds maintenance. Feb 1988. v. 23 (2). p. 86, 88. ill. (NAL Call No.: DNAL SB476.G7).

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MYCOAE. Goldfarb, B. Nelson, E.E.; Hansen, E.M. Bronx, N.Y. : The New York Botanical Garden. Mycologia. May/June 1989. v. 81 (3). p. 375-381. Includes references. (NAL Call No.: DNAL 450 M99).

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### **Twenty-year performances of Scotch, European black (Austrian), red, and jack pines in eastern Nebraska.**

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**Two new terpenoids from root bark of *Azadirachta indica*.**

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**Ultrasonic acoustical emissions from sapwood of eastern white pine, northern red oak, red maple, and paper birch: implications for bark- and wood-feeding insects.**

FETMA. Haack, R.A. Blank, R.W.; Fink, F.T.; Mattson, W.J. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1988. v. 71 (4). p. 427-440. Includes references. (NAL Call No.: DNAL 420 F662).

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**Understanding seedling hardiness.**

Fletcher, R. Fort Collins, Colo. : The Service. Forestry research west - United States Department of Agriculture, Forest Service. Mar 1986. p. 10-13. ill. (NAL Call No.: DNAL ASD11.F6).

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**Use of excessive waterlogging and physiological responses to measure genetic variation in loblolly pine waterlogging tolerance.**

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**Using tree growth regulators to maintain trimmed trees on electric utility rights-of-way.**

PNWSB. Watson, M.R. Brown, G.B. Jr. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science

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**Utilization of freshwater and ocean water by coastal plants of southern Florida.**

ECOLA. Sternberg, L. da S.L. Swart, P.K. Tempe, Ariz : Ecological Society of America. Ecology : a publication of the Ecological Society of America. Dec 1987. v. 68 (6). p. 1898-1905. ill., maps. Includes references. (NAL Call No.: DNAL 410 EC7).

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**Variable chlorophyll a fluorescence and CO<sub>2</sub> uptake in water-stressed white spruce seedlings.**

PLPHA. Toivonen, P. Vidaver, W. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Mar 1988. v. 86 (3). p. 744-748. Includes references. (NAL Call No.: DNAL 450 P692).

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**Variation in growth of red alder families in relation to shallow water table levels.**

FOSCA. Hook, D.D. Murray, M.D.; DeBell, D.S.; Wilson, B.C. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1987. v. 33 (1). p. 224-229. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Variations in nutrient levels as a defense: identifying key nutritional traits of host plants of the western spruce budworm.**

Clancy, K.M. Wagner, M.R.; Tinus, R.W. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 203-213. Includes references. (NAL Call No.: DNAL SB761.M46).

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**Vegetation management: its influence on survival and early growth of fraser fir and Norway spruce.**

JOSHB. Warren, S.L. Skroch, W.A.; Perry, K.B.; Monaco, T.J. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1987. v. 112 (6). p. 955-962. Includes references. (NAL Call No.: DNAL 81 S012).



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**Water potential of fraser fir infested with balsam woolly adelgid (Homoptera: Adelgidae).**  
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**Water relations and productivity in pinyon-juniper habitat types.**  
XGTIA. Barnes, F.J. Cunningham, G.L. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at a "Conference on Pinyon-Juniper," January 13-16, 1986, Reno, Nevada. Jan 1987. (215). p. 406-411. Includes references. (NAL Call No.: DNAL aSD11.A48).

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Roberts, B.R. Schnipke, V.M. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Dec 1987. v. 5 (4). p. 173-175. Includes references. (NAL Call No.: DNAL SB1.J66).

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**Water stress promotes early flowering in jack pine.**  
XAFNB. Riemenschneider, D.E. St. Paul, Minn. : The Station. USDA Forest Service research note NC - United States, North Central Forest Experiment Station. 1985. (331). 3 p. Includes references. (NAL Call No.: DNAL aSD11.A33).

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**Water stress response after thinning lodgepole pine stands in Montana.**  
XGTIA. Running, S.W. Donner, B.L. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Research Station. Paper presented at the "Workshop on Management of Small-Stem Stands of Lodgepole Pine," June 30-July 2, 1986, Fairmont Hot Springs, Montana. Oct 1987. (237). p. 111-117. Includes references. (NAL Call No.: DNAL aSD11.A48).

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**Water stress response after thinning Pinus contorta stands in Montana.**  
FOSCA. Donner, B.L. Running, S.W. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1986. v. 32 (3). p. 614-625. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Western spruce budworm outbreaks in northern New Mexico: tree-ring evidence of occurrence and radial growth impacts from 1700 to 1983.**  
Swetnam, T.W. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 130-141. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**Wind erosion reduces red pine growth on a sandy outwash soil.**  
JSWCA3. Farrish, K.W. Ankeny, Iowa : Soil Conservation Society of America. Journal of soil and water conservation. Jan/Feb 1987. v. 42 (1). p. 55-57. maps. Includes references. (NAL Call No.: DNAL 56.8 J822).

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**Wind patterns and the seasonal occurrence of Juniperus pollen in Tulsa.**  
Levetin, E. Buck, P. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 292-293. maps. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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**Woody seedling dynamics in an east Texas floodplain forest.**  
ECMOA. Streng, D.R. Glitzenstein, J.S.; Harcombe, P.A. Tempe, Ariz. : Ecological Society of America. Ecological monographs. June 1989. v. 59 (2). p. 177-204. Includes references. (NAL Call No.: DNAL 410 EC72).

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SWNAA. Fonteyn, P.J. McClean, T.M.; Akridge, R.E. Austin : Southwestern Association of Naturalists. The Southwestern naturalist. Mar 27, 1985. v. 30 (1). p. 141-146. Includes references. (NAL Call No.: DNAL 409.6 S08).



# PLANT TAXONOMY AND GEOGRAPHY

1097

**Acacia rigidula (Fabaceae) and related species in Mexico and Texas.**

SYBOD. Lee, Y.S. Seigler, D.S.; Ebinger, J.E. Lawrence, Kan. : American Society of Plant Taxonomists. Systematic botany. Jan/Mar 1989. v. 14 (1). p. 91-100. maps. Includes references. (NAL Call No.: DNAL QK95.S97).

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**Ambrodiscus, a new genus of inoperculate Discomycetes from ambrosia beetle galleries.**

MYCOAE. Carpenter, S.E. Bronx, N.Y. : The New York Botanical Garden. Mycologia. May/June 1988. v. 80 (3). p. 320-323. ill. Includes references. (NAL Call No.: DNAL 450 M99).

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**Chemical variation in lodgepole pine with latitude, elevation, and diameter class.**

FPJOA. Kim, W.J. Campbell, A.G.; Koch, P. Madison, Wis. : Forest Products Research Society. Lodgepole pine (*Pinus contorta* var. *latifolia* and *murrayana*) is one of the most abundant and underutilized forest resources in the Northwest United States and Canada. This paper describes the chemical variation in lodgepole pine over its geographical range. The sample trees were collected from nine different latitudes (40 degrees to 60 degrees north), three elevations (low, medium, and high), and three diameter classes (76, 152, and 228 mm DBH). The average chemical composition of the *latifolia* stems was 0.26 percent ash, 2.87 percent extractives, 25.81 percent lignin, 80.40 percent holocellulose, and 49.64 percent alpha-cellulose. The average pH was 4.57. Ash, lignin, and holocellulose were negatively correlated with latitude, while alpha-cellulose generally increased as latitude increased. The extractive content was positively correlated with latitude. The ash content and pH were negatively correlated with diameter class, while extractive content was positively correlated with diameter class. The *latifolia* and *murrayana* trees had similar chemical characteristics and no extreme chemical variabilities that would limit ordinary wood utilization. Forest products journal. Mar 1989. v. 39 (3). p. 7-12. maps. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Crustoderma longicystidia associated with decay of lumber in British Columbia, and the cultural features of *C. dryina*.**

MYCOAE. Ginns, J. Clark, J. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Nov/Dec 1989. v. 81 (6). p. 921-926. ill. Includes references. (NAL Call No.: DNAL 450 M99).

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**Ectomycorrhizal fungi associated with *Pinus edulis* in the Piceance Basin of Colorado.**

MYXNAE. Acsai, J. Ithaca, N.Y. : Mycotaxon, Ltd. Mycotaxon. Apr/June 1989. v. 35 (1). p. 107-119. ill. Includes references. (NAL Call No.: DNAL QK603.2.M9).

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**Environmental factors involved in the growth and distribution of post oak in the southcentral United States.**

Stahle, D.W. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 54-58. maps. Includes references. (NAL Call No.: DNAL QK477.2.A615 1986).

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EVETEX. Coleman, J.S. Jones, C.G. College Park, Md. : Entomological Society of America. The effect of acute ozone exposure of eastern cottonwood (*Populus deltoides* Bartr.) on the survivorship, reproduction, and development of the aphid *Chaitophorus populicola* Thomas (Homoptera: Aphididae) was investigated. Cottonwoods were exposed to 397 microgram/m<sup>3</sup> (0.20 ppm) ozone or charcoal-filtered air and infested with aphids on leaf plastochron index 5, 40 h after fumigation. Aphid performance was not significantly different on plants exposed to ozone compared with charcoal-filtered air-treated control plants. These data do not support the notion that aphid performance will directly increase on air pollution-stressed plants. We also examined settling and feeding

preference of aphids for cottonwood leaves of different developmental ages. Aphids significantly preferred leaf plastochron index 5 to all other leaf ages. These data support hypotheses relating aphid leaf preference to stages of leaf development. Reproduction of the cottonwood leaf rust fungus (*Melampsora medusae* Thum.) and the imported willow leaf beetle (*Plagioderma versicolora* Laicharting) are reduced on ozone-fumigated plants (reported elsewhere). If aphid populations are affected by competition with these cottonwood pests for leaf resources, then aphid pest potential may actually increase in areas characterized by episodic ozone concentrations because of ozone-induced decreases in populations of *M. medusae* and *P. versicolora*. Environmental entomology. Apr 1988. v. 17 (2). p. 207-212. Includes references. (NAL Call No.: DNAL QL461.E532).

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EVETEX. Hamerski, M.R. Hall, R.W. Lanham, Md. : Entomological Society of America. Reproductive behavior of the egg parasitoid *Tetrastichus gallerucae* (Fonscolombe) is described. Males show the same distinct behavioral pattern before and after copulation. Males were aggressive toward other males on or near parasitized egg masses. No overt female courtship behavior was observed. Males mated more than once, but females were unreceptive after a successful copulation. Oviposition and associated behavior for each female was >8 h on elm leaf beetle, *Xanthogaleruca* (=Pyrrhalta) luteola (Muller), egg masses of 20 eggs. Females did not show any egg guarding or external marking behavior. Possible costs of female ovipositional behavior and male guarding behavior are discussed. Environmental entomology. Oct 1989. v. 18 (5). p. 791-794. Includes references. (NAL Call No.: DNAL QL461.E532).

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XGNEA. Barry, J.W. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 144-146. (NAL Call No.: DNAL ASD11.U56).

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### **Biological control of arthropod pests: traditional and emerging technologies.**

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FOPSA. Weseloh, R.M. New Haven, Conn. : The Station. Frontiers of plant science - Connecticut Agricultural Experiment Station. Fall 1986. v. 39 (1). p. 2-3. ill. (NAL Call No.: DNAL 100 F92).

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GRLEA. Wilson, L.F. Sapio, F.J.; Simmons, G.A. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Fall 1988. v. 21 (3). p. 97-104. ill. Includes references. (NAL Call No.: DNAL QL461.M5).

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**Biology, population trends, and damage of *Pineus boernerii* and *P. coloradensis* (Homoptera: Adelgidae) on red pine.**  
EVETEX. McClure, M.S. Lanham, Md. : Entomological Society of America. Two adelgids, *Pineus boernerii* Annand and *P. coloradensis* (Gillette), are serious pests of red pine, *Pinus resinosa* Aiton, in parts of New England. Both species are parthenogenetic, trivoltine, and complete six stages of development. The life stages were readily distinguished from one another within and between species by body size and by several morphological features including antennae, setae, and wax-producing glands. Generation overlap was so pronounced that all life stages of these adelgids were present nearly all times during the year. *Pineus boernerii*, an introduced species, spread at an average rate of 15 km per year during a 5-yr period between surveys. It invaded 21 of the 48 red pine stands sampled in Connecticut and Massachusetts, which is south of the natural range of *P. resinosa*, and injured and killed trees at all of the inhabited sites. *P. coloradensis*, a native and heretofore innocuous species, occurred in all 10 stands sampled in New Hampshire and Vermont, which is within the natural range of *P. resinosa*, and in 35 of the 48 plantations located in Connecticut and Massachusetts. Surprisingly, it injured and killed trees in more than 40% of these stands in both areas. Population trends of these adelgids during a 5-yr period indicated that *P. boernerii* had displaced *P. coloradensis* in all 3 previously cohabited pine stands and in 7 of 12 others where *P. coloradensis* initially had occurred alone and where *P. boernerii* invaded subsequently. In four of the five remaining stands in the latter category, *P. coloradensis* had been reduced to very low density. These results reaffirm the superior competitive ability of *P. boernerii* demonstrated in laboratory experiments. Environmental entomology. Dec 1989. v. 18 (6). p. 1066-1073. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Bionomics of *Glyphidocera juniperella* (Lepidoptera: Blastobasidae), a newly discovered pest of container-grown juniper.**  
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**Bionomics of *Pissodes nemorensis* Germar (Coleoptera: Curculionidae) in northern Florida.**  
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**Bionomics of *Stamnodes animata* (Pearsall) a new defoliator of mountain mahogany.**  
WSEPA. Furniss, M.M. Pullman, Wash. : The Society. Proceedings - Washington State Entomological Society. Apr/Sept 1985. (47). p. 734. (NAL Call No.: DNAL QL461.W3).

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Holsten, E.H. Vandre, W. Fairbanks : The Services. Publication - University of Alaska. Cooperative Extension Service. Division of Statewide Services. Oct 1985. (A-O-063). 8 p. ill. (NAL Call No.: DNAL 275.29 AL13P).

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Ferrell, G. Washington, D.C. : The Service. Forest insect & disease leaflet - U.S. Department of Agriculture Forest Service. May 1986. (91,rev.). 4 p. ill., maps. Includes references. (NAL Call No.: DNAL A423.9 F764).

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JOARD. Santamour, F.S. Steiner, K.C. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Aug 1986. v. 12 (8). p. 199-201. Includes references. (NAL Call No.: DNAL SB436.J6).

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WUEXA. Suomi, D. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Insect Answers. Apr 1987. (1380). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

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XATBA. Stipe, L.E. Washington, D.C. : The Department. Technical bulletin - United States Dept. of Agriculture. In the series analytic: Western Spruce Budworm / Martha H. Brooks... et.al. May 1987. (1694). p. 8-16. (NAL Call No.: DNAL 1 AG84TE).

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### **Can attractants be used to manage insect pests of windbreak trees?.**

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XGNEA. Irving, H.J. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 3-5. Includes references. (NAL Call No.: DNAL aSD11.U56).

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### **Carbaryl and lindane protect white spruce from attack by spruce beetles (Coleoptera: Scolytidae) for three growing seasons.**

JEENAI. Werner, R.A. Hastings, F.L.; Holsten, E.H.; Jones, A.S. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1986. v. 79 (4). p. 1121-1124. Includes references. (NAL Call No.: DNAL 421 J822).



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JFUSA. Gibson, K.E. Bennett, D.D. Bethesda, Md. : Society of American Foresters. Journal of forestry. Feb 1985. v. 83 (2). p. 109-111. ill. Includes references. (NAL Call No.: DNAL 99.8 F768).

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Mattson, W.J. Palmer, S.R. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 157-169. Includes references. (NAL Call No.: DNAL SB761.M46).

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**Changes in population size, dispersal behavior, and reproduction of *Calosoma sycophanta* (Coleoptera: Carabidae), associated with changes in gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae), abundance.**

EVETEX. Weseloh, R.M. College Park, Md. : Entomological Society of America. Environmental entomology. June 1985. v. 14 (3). p. 370-377. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Characteristics of egg parasitization of Douglas-fir tussock moth, *Orgyia pseudotsugata* (McD.) (Lepidoptera: Lymantriidae), by *Telenomus californicus* Ash. (Hymenoptera: Scelionidae).**

EVETEX. Torgersen, T.R. Mason, R.R. College Park, Md. : Entomological Society of America. Environmental entomology. June 1985. v. 14 (3). p. 323-328. Includes references. (NAL Call No.: DNAL QL461.E532).

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WOODFAJ. Shamoun, S.F. Levi, M.P. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1985. v. 17 (1). p.

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**Chemical control of three white grub species (Coleoptera: Scarabaeidae) attacking Fraser fir Christmas trees in the southern Appalachians.**

JESCEP. Kard, B.M.R. Hain, F.P. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Jan 1987. v. 22 (1). p. 84-89. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Chemical insecticides for spruce budworm.**

XGNEA. Helson, B.V. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 131-135. Includes references. (NAL Call No.: DNAL aSD11.U56).

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**Chemical treatments for brood control and suppression of *Dendroctonus adjunctus* attacks on ponderosa pine.**

SENTD. Kinzer, H.G. Reeves, J.M. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. Dec 1985. v. 10 (4). p. 244-252. Includes references. (NAL Call No.: DNAL QL461.S65).

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**Chemicals for control of common insect and mite pests in southern pine nurseries.**

SJAFD. Bacon, C.G. South, D.B. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1989. v. 13 (3). p. 112-116. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Chemistry and field evaluation of the sex pheromone of ponderosa pine tip moth, *Rhyacionia zozana* (Lepidoptera: Tortricidae).**

EVETEX. Niwa, C.G. Sower, L.L.; Daterman, G.E. College Park, Md. : Entomological Society of America. Environmental entomology. Dec 1987. v. 16 (6). p. 1287-1290. Includes references. (NAL Call No.: DNAL QL461.E532).

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Barbour, E.F. Race, S.R. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1986. (172). 2 p. (NAL Call No.: DNAL S544.3.N5F7).

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XGNEA. Gunner, H.B. Zimet, M.; Berger, S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 103-108. Includes references. (NAL Call No.: DNAL aSD11.U56).

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### **Chronic herbivory: impacts on architecture and sex expression of pinyon pine.**

SCIEA. Whitman, T.G. Mopper, S. Washington, D.C. : American Association for the Advancement of Science. Science. May 31, 1985. v. 228 (4703). p. 1089-1091. ill. Includes 23 references. (NAL Call No.: DNAL 470 SCI2).

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### **Clare County: summary of gypsy moth impacts, management activities, and plans.**

MUCBA. Gould, L. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 14-15. maps. (NAL Call No.: DNAL 275.29 M58B).

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### **Classification of airborne multispectral scanner data for mapping current defoliation caused by the spruce budworm.**

FOSCA. Leckie, D.G. Ostaff, D.P. Bethesda, Md. : Society of American Foresters. Abstract: Airborne multispectral scanner data were acquired over a mixed fir and spruce forest affected by both current defoliation (red discoloration) and cumulative defoliation (loss of needles) caused by feeding of the spruce budworm (*Choristoneura fumiferana* Clem.). The spectral bands, ratios and differences of bands, and principal components derived from the bands were examined for their usefulness for discriminating defoliation condition. Classifications were conducted using the best combinations of two through nine bands or features derived from the bands. Three levels of current defoliation could be classified

(heavy, light, and healthy). Cumulative defoliation and mixed-wood areas caused confusions in the classifications. There was little advantage to including more than four bands or derived features in the classifications. For SCI. 34(2):259-275. Forest science. June 1988. v. 34 (2). p. 259-275. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Climatological discriminant model.**

XATBA. Kemp, W.P. Washington, D.C. : The Department. Technical bulletin - United States Dept. of Agriculture. In the series analytic: Managing trees and stands susceptible to western spruce budworm/edited by M.H. Brookes, J.J. Colbert; R.G. Mitchell and R.W. Stark. Dec 1985. (1695). p. 43-45. maps. (NAL Call No.: DNAL 1 AG84TE).

1314

### **Clonal development of coyote willow, *Salix exigua* (Salicaceae), and attack by the shoot-galling sawfly, *Euura exiguae* (Hymenoptera: Tenthredinidae).**

EVETEX. Price, P.W. Lanham, Md. : Entomological Society of America. Five clones of the willow, *Salix exigua* Nuttall, along the Weber River, Utah, produced shorter shoots with increasing ramet age. The number of ovipositions by the shoot-galling sawfly, *Euura exiguae* Smith, correlated positively with shoot length, so that sawfly density was high on younger ramets of a clone and low on older ramets. The sawfly attacked the most vigorous parts of the clones. Survival of progeny in galls decreased with ramet age from 60% survival on 1-yr-old ramets to 26% survival on 6-yr-old ramets when plant-induced mortality was considered alone. The effects of parasitoids on the pattern of sawfly attack was not significant. Survival of progeny in young ramets (2 and 3 yr old) was higher in the egg to very early first-instar stage (50%) than in older ramets (37%) (5 and 6 yr old), but differences were slight after that stage. The major determinants of *Euura* population distribution on willow clones were the female selective oviposition behavior on longer shoots on younger ramets, which probably evolved in response to higher survival of progeny in the younger ramets. When the relative effects of attack and survival were evaluated in response to ramet age, age accounted for 89% of the variance in attack and 95% of the variance in survival. The contrast between this species and others that attack vigorous plants and plant parts and those that attack stressed plants is emphasized, and an explanation is proposed for the difference between epidemic pest insect herbivores and those that remain as endemic species. Environmental entomology. Feb 1989. v. 18. p. 61-68. Includes references. (NAL Call No.: DNAL QL461.E532).



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**The coconut palm eriophyid mite, *Eriophyes guerreronis* (Keifer) in Puerto Rico (Acarina: Eriophyidae).**

JAUPA. Medina-Gaud, S. Abreu, E. Mayaguez : University of Puerto Rico, Agricultural Experiment Station. The Journal of agriculture of the University of Puerto Rico. July 1986. v. 70 (3). p. 223-224. Includes references. (NAL Call No.: DNAL 8 P832J).

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a lesser extent predicted Siberian elm damage. Egg density on both hosts was highly associated with the proportion of samples infested with eggs. The maximum proportion of presence-absence samples infested with first generation eggs predicted cumulative damage to English but not to Siberian elm. When no effort was made to control beetle populations most English elm trees sustained more than 40% damage to retained foliage, whereas damage to most Siberian elms was less. *Environmental entomology*. Oct 1989. v. 18 (5). p. 849-853. Includes references. (NAL Call No.: DNAL QL461.E532).

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### **Development and implementation of a gypsy moth integrated pest management program.**

JOARD. Reardon, R. McManus, M.; Kolodny-Hirsch, D.; Tichenor, R.; Raupp, M.; Schwalbe, C.; Webb, R.; Meckley, P. Urbana, Ill. : International Society of Arboriculture. *Journal of arboriculture*. Literature review. Sept 1987. v. 13 (9). p. 209-216. ill., maps. Includes references. (NAL Call No.: DNAL SB436.U6).

1379

### **Development and implementation of the southern pine beetle decision support system.**

Saunders, M.C. Loh, P.K.; Coulson, R.N.; Rykiel, E.J.; Payne, T.L.; Pulley, P.E.; Hu, L.C. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 335-363. ill. Includes references. (NAL Call No.: DNAL ASD11.U57).

1380

### **Development and mortality of *Ips avulsus* (Coleoptera: Scolytidae) at constant temperatures.**

EVETEX. Wagner, T.L. Hennier, P.B.; Flamm, R.O.; Coulson, R.N. College Park, Md. : Entomological Society of America. Aspects of the development and mortality of *Ips avulsus* (Eichhoff) were studied at seven constant temperatures from 10 to 35 degrees C. On average, eggs occupied 10.3% of the total time in the host, larvae 34.8%, pupae 11.8%, and teneral adults 43.1%. Plots of development



rates (reciprocal of median times) and percent mortalities versus constant temperatures indicated that the insect is well adapted to high temperatures but sensitive to low temperatures. The timing of oviposition relative to sibling oviposition time in a slab had little effect on the development times of any life stage or the life cycle. Oviposition time influenced life-stage and life-cycle mortality, although the effects were not great. For example, the probability of larval death increased from 16.6 to 28.7% for individuals originating in the first and fourth quarters of the oviposition period. The probability of death due to cannibalism was less than 10% and was not influenced by oviposition time. No difference was observed in the overall proportion of males to total emerging beetles (0.496) and 0.5; however, this proportion increased with time throughout the emergence period. Models were developed to predict life-stage and life-cycle development times as functions of temperature. A mechanistic model described the development rate versus constant temperature relationship, whereas a cumulative Weibull function described the temperature-independent distributions of normalized development times. The life-cycle model was validated using a multiple-cohort simulation procedure and data of *I. avulsus* emergence from three trees in each of three field plots. The validation indicated model suitability in a larger model of population dynamics, although additional testing is indicated. *Environmental entomology*. Apr 1988. v. 17 (2). p. 181-191. Includes references. (NAL Call No.: DNAL QL461.E532).

1381

**Development and mortality of *Ips calligraphus* (Coleoptera: Scolytidae) at constant temperatures.**

EVETEX. Wagner, T.L. Fargo, W.S.; Flamm, R.D.; Coulson, R.N.; Pulley, P.E. Lanham, Md. : Entomological Society of America. We describe effects of constant temperature, beetle density, and time of oviposition on aspects of development, mortality, sex ratio, and size of *Ips calligraphus* (Germar). Emphasis is placed on individual life stages. Relationships of median development times to constant temperatures were similar for eggs, larvae, and pupae in the 12.5-37.5 degrees C range. These relationships appeared as backward J-shaped curves. Reciprocal development times versus temperatures for these life stages were described by the six-parameter rate function of Sharpe & DeMichele (1977, *J. Theor. Biol.* 64: 649-670). Development times and foraging distances of larvae increased with each instar. The third instar required 61% of total larval time and excavated 73% of the total larval gallery. Optimum development temperature of teneral adults was not identified, indicating greater tolerance to high temperatures of this stage compared with the others. The four-parameter Sharpe & DeMichele (1977) model (without high-temperature inhibition) described teneral adult rate as a function of temperature. Timing of oviposition influenced development time of larvae (increased

development time with late oviposition) and teneral adults (decreased), but not development times of eggs or pupae. Reversed patterns of longer development times for larvae and shorter times for teneral adults canceled any effects of sequential oviposition on length of life cycle. Distributions of development times were generally skewed toward the longer times, and variation around mean time tended to increase with successive life stage. A single, temperature-independent distribution of normalized development times is presented for each life stage and is described by a three-parameter cumulative Weibull function. stage-specific mortality (resulting from unknown causes) formed partial or full U-shaped patterns when plotted against temperature. Density-dependent mortality resulting from cannibalism is discussed, with a Weibull function. *Environmental entomology*. Apr 1987. v. 16 (2). p. 484-496. Includes references. (NAL Call No.: DNAL QL461.E532).

1382

**Development, implementation, and validation of a large area hazard- and risk-rating system for southern pine beetle.**

Billings, R.F. Bryant, C.M.; Wilson, K.H. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 226-232. Includes references. (NAL Call No.: DNAL aSD11.U57).

1383

**The development of a computerized database management system for Midland County.**

MUCBA. Gage, S.H. Wirth, T.M. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 50-51. (NAL Call No.: DNAL 275.29 M58B).

1384

**Development of wound tissue in the bark of Fraser fir and its relation to injury by the balsam woolly adelgid.**

GENSAB. Arthur, F.H. Hain, F.P. Athens, Ga. : The Society. *Journal of Entomological Science*. Jan 1985. v. 20 (1). p. 129-135. Includes references. (NAL Call No.: DNAL QL461.G4).



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1385

**Development, reproduction, and competitive interactions between two sympatric leafhopper species (Homoptera: Cicadellidae) on redbud trees.**

EVETEX. Hunter, C.E. Yeargan, K.V. Lanham, Md. : Entomological Society of America. The developmental and reproductive biologies of two sympatric leafhoppers, *Erythroneura aclys* McAtee and *Erythroneura bistrata* McAtee were studied, as well as their responses to intra- and interspecific competition. Both leafhoppers specialize on redbud trees, *Cercis canadensis* L. *E. aclys* eggs developed faster in the field than *E. bistrata* eggs in 1985 but not in 1986; developmental periods for nymphs in the field did not differ significantly between species in either year. Under controlled but fluctuating warm temperatures (19-29 degrees C; average = 24 degree C), egg developmental periods did not differ significantly between species, but nymphal *E. aclys* developed faster than nymphal *E. bistrata*. Under controlled, cool fluctuating temperatures (11-21 degrees C; average = 16 degrees C), eggs and nymphs of *E. aclys* developed more quickly than those of *E. bistrata*. *E. aclys* and *E. bistrata* did not have statistically different pre-ovipositional periods, ovipositional periods, fecundities, or average daily ovipositional rates. Pre-ovipositional periods were longer in the first generation for both species. Both species exhibited a similar significant density-dependent response in a competition study. Fewer progeny were produced per female as density in a cage increased. There were no differences between species in the number of progeny produced whether caged as mixed or single species. Interspecific competition did not affect either species to a greater degree than did intraspecific competition. Shorter developmental requirements of *E. aclys* and its early-season ovipositional pattern may maintain this species as the numerically dominant of the two *Erythroneura* species at the primary study site on the University of Kentucky campus. Environmental entomology. Feb 1989. v. 18. p. 127-132. Includes references. (NAL Call No.: DNAL QL461.E532).

1386

**Developments in commercially produced microbials at Biochem Products.**

XGNEA. Lublinkhof, J. Ross, D.H. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 137. (NAL Call No.: DNAL aSD11.U56).

1387

**Diagnosing injury to eastern forest trees a manual for identifying damage caused by air pollution, pathogens, insects, and abiotic stresses /National Acid Precipitation Assessment Program, Forest Response Program, National Vegetation Survey Research Cooperative.**

University Park, Penn. : Agricultural Information Service, College of Agriculture and the Dept. of Plant Pathology, Pennsylvania State University for USDA-Forest Service, 1987. "Published under a cooperative agreement with the United States Department of Agriculture-Forest Service, Forest Pest Management, Atlanta, Georgia, and The Pennsylvania State University, College of Agriculture, Department of Plant Pathology, University Park, Pennsylvania." vii, 122 p. : col. ill. ; 28 cm. Bibliography: p. 121. (NAL Call No.: DNAL SB762.D43).

1388

**Differential susceptibility of *Toumeyella pini* (King) (Homoptera: Coccidae) to pyrethroid and organophosphate insecticides: a factor in outbreaks in southern pine seed orchards.**

JEENAI. Clarke, S.R. Debarr, G.L.; Berisford, C.W. College Park, Md. : Entomological Society of America. Contact toxicities of nine insecticides (four organophosphorous insecticides and five pyrethroids) were tested on crawlers of a striped pine scale, *Toumeyella pini* (King). Organophosphorous insecticides were more toxic than pyrethroids. Chlorpyrifos was the most toxic, and fenvalerate was the least toxic. Residual tests showed that the pyrethroid esfenvalerate lost its toxic effects at a slightly faster rate than the organophosphorous insecticide azinphos-methyl. Low toxicity of the pyrethroids to crawlers may be partially responsible for the rapid build-up of *T. pini* in southern pine seed orchards. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1443-1445. Includes references. (NAL Call No.: DNAL 421 J822).

1389

**Direct control of insect defoliation in oak stands is economically feasible in preventing timber value loss.**

XFGTA. Hicks, R.R. Jr. Riddle, K.S.; Brock, S.M. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 86-94. maps. Includes references. (NAL Call No.: DNAL aSD11.A352).



1390

**Dispersal of second-instar western spruce budworm above and below forest canopies in western Montana.**

XFINA. Carlson, C.E. McCarthy, G.J. Ogden, Utah : The Station. Research note INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. June 1989. (388). 6 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764UN).

1391

**Distribution and abundance of early instar gypsy moth (Lepidoptera: Lymantriidae) in forests during day and night.**

EVETEX. Ticehurst, M. Yendol, W. Lanham, Md. : Entomological Society of America. Studies were conducted to determine the distribution and abundance of early instar gypsy moth, *Lymantria dispar* (L.), within canopies of codominant *Quercus rubra* L., *Q. alba* L., and *Q. prinus* L. in moderate and dense populations during the day; and to compare the distribution and abundance of early instar gypsy moth within canopies of *Q. rubra* trees, saplings, and seedlings, and saplings of witch hazel, *Hamamelis virginiana* L., during day and night in a moderate population. Most larvae were observed in the lower canopy of codominant trees in all sites during the day. Variation associated with tree species was not significant at any site. Larval abundance was highly correlated,  $r(2) = 0.992$ , with pre-season egg mass density. No differences in larval abundance or distribution were detected during day and night. More than 80% of all larvae were observed in the lower canopy, understory, and forest floor day and night. The most larvae per 1,000 leaves were detected on seedlings and the least in the upper canopy of codominant trees. The target for the aerial application of insecticides and release of parasitoids occupies a lower vertical position in the forest than was previously thought. *Environmental entomology*. June 1989. v. 18 (3). p. 459-464. Includes references. (NAL Call No.: DNAL QL461.E532).

1392

**Distribution and dynamics of aphid (Homoptera: Drepanosiphidae) populations on *Betula pendula* in northern California.**

HILGA. Hajek, A.E. Dahlsten, D.L. Berkeley, Calif. : California Agricultural Experiment Station. *Hilgardia* : a journal of agricultural science. Feb 1988. v. 56 (1). p. 1-33. (NAL Call No.: DNAL 100 C12H).

1393

**Distribution and habitats of the formosan subterranean termite (Isoptera: Rhinotermitidae) in South Carolina.**

JEENAI. Chambers, D.M. Zungoli, P.A.; Hill, H.S. Jr. Lanham, Md. : Entomological Society of America. *Journal of economic entomology*. Dec 1988. v. 81 (6). p. 1611-1619. Includes references. (NAL Call No.: DNAL 421 J822).

1394

**Distribution and parasitism of winter moth, *Operophtera brumata* (Lepidoptera: Geometridae), in western Oregon.**

EVETEX. Kimberling, D.N. Miller, J.C.; Penrose, R.L. College Park, Md. : Entomological Society of America. *Environmental entomology*. Oct 1986. v. 15 (5). p. 1042-1046. Includes references. (NAL Call No.: DNAL QL461.E532).

1395

**Distribution of arsenic in lodgepole pines treated with MSMA.**

Maclauchlan, L.E. Borden, J.H.; D'Auria, J.M. Bethesda, Md. : Society of American Foresters. *Western journal of applied forestry*. Apr 1988. v. 3 (2). p. 37-40. Includes references. (NAL Call No.: DNAL SD388.W6).

1396

**Distribution of arsenic in MSMA-treated lodgepole pines infested by the mountain pine beetle, *Dendroctonus ponderosae* (Coleoptera: Scolytidae), and its relationship to beetle mortality.**

JEENAI. Maclauchlan, L.E. Borden, J.H.; D'Auria, J.M.; Wheeler, L.A. Lanham, Md. : Entomological Society of America. The LC50 of MSMA (monosodium methanearsonate) for first- and second-instar mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins, mining for 4 d in ground phloem tissue impregnated with methane arsonic acid, the pure form of arsenic in MSMA, was 102 ppm. Application of MSMA 3 wk after attack to axe-frills (cuts) near the root collar of five lodgepole pines, *Pinus contorta* var. *latifolia* Engelman, resulted in high accumulations of arsenic in phloem and sapwood near the point of application and in foliage 11 wk later. MPB taken from bolts cut from MSMA-treated trees 1 m above the axe-frill were all dead. There was a strong relationship between amounts of arsenic in MPB and those in phloem tissue up to 2 m. At sampling points above 2 m on treated trees, arsenic residues in phloem and sapwood were, on average, not significantly different from those occurring naturally in tissues of lodgepole pine. Enough arsenic could have passed through the tissues to kill or inhibit the brood MPB within the trees, but MPB mortality was probably due to an interaction of many factors including moisture deficit and fungal invasion of the host tree. *Journal of economic entomology*. Feb 1988. v. 81



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(1). p. 274-280. ill. Includes references. (NAL Call No.: DNAL 421 J822).

1397

**Does foliage damage influence predation on the insect herbivores of birch?**

ECOLA. Bergelson, J.M. Lawton, J.H. Tempe, Ariz : Ecological Society of America. Ecology : a publication of the Ecological Society of America. Apr 1988. v. 69 (2). p. 434-445. ill. Includes references. (NAL Call No.: DNAL 410 EC7).

1398

**Does verbenone reduce mountain pine beetle attacks in susceptible stands of ponderosa pine?**

XARRA. Bentz, B. Lister, C.K.; Schmid, J.M.; Mata, S.A.; Rasmussen, L.A.; Haneman, D. Fort Collins, Colo. : The Station. Research note RM - U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. Includes statistical data. Oct 1989. (495). 4 p. Includes references. (NAL Call No.: DNAL A99.9 F7632US).

1399

**Don't move gypsy moth.**

Washington, D.C. : The Department. Program aid - United States Department of Agriculture. July 1985. (1329, slightly rev.). 11 p. ill., maps. (NAL Call No.: DNAL 1 AG84PRO).

1400

**The Douglas-fir tussock moth in the interior pacific northwest.**

Mason, R.R. Wickman, B.E. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 179-209. ill., maps. Includes references. (NAL Call No.: DNAL SB761.D96).

1401

**Douglas-fir tussock moth in the Western United States.**

Washington, D.C. : The Department. Program aid - United States Department of Agriculture. Dec 1987. (1401). 8 p. ill. (NAL Call No.: DNAL 1 AG84PRO).

1402

**Draft environmental impact statement for the suppression of the Southern pine beetle, Southern region /U.S. Dept. of Agriculture, Forest Service, Southern Region ; responsible official: R. Max Peterson. --.**

Peterson, R. Max. Atlanta, Ga. : The Region, 1986. Title on spine: DEIS for the suppression of the SPB - Southern region.~ "July 1986"--cover. ca. 600 p. in various pagings : ill., maps ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL aSB945.S635D7).

1403

**Droplet deposit from aerial applications of different pesticide formulations.**

XGNEA. Sundaram, A. Sundaram, K.M.S.; Cadogan, B.L. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 121-126. Includes references. (NAL Call No.: DNAL aSD11.U56).

1404

**The Dutch elm disease.**

McDaniel, M.C. Jones, B.F.; Tainter, F.H. Little Rock, Ark. : The Service. Leaflet EL - Arkansas University, Cooperative Extension Service. Apr 1987. (467). 8 p. ill. (NAL Call No.: DNAL 275.29 AR4LE).

1405

**Dynamics of forest insect populations patterns. causes, implications /edited by Alan A. Berryman.**

Berryman, A. A. 1937-. New York : Plenum Press, c1988. xx, 603 p. : ill. ; 26 cm. Includes bibliographies and indexes. (NAL Call No.: DNAL SB761.D96).

1406

**Early impact and control of aphid (Chaitophorus populicola Thomas) infestations on young cottonwood plantations in the Mississippi Delta.**

XFNSA. Solomon, J.D. New Orleans, La. : The Station. U.S. Forest Service research note SO - United States, Southern Forest Experiment Station. Aug 1986. (326). 4 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7628U).

1407

**Effect of aerial application of racemic disparlure on male trap catch and female mating success of gypsy moth (Lepidoptera: Lymantriidae).**

JEENAI. Webb, R.E. Tatman, K.M.; Leonhardt, B.A.; Plimmer, J.R.; Boyd, V.K.; Bystrak, P.G.; Schwalbe, C.P.; Douglass, L.W. Lanham, Md. : Entomological Society of America. Studies were conducted in Cecil County, Md., during the summer of 1980 using racemic disparlure to disrupt mating communication of the gypsy moth, *Lymantria dispar* (L.). A laminated plastic flake formulation of racemic disparlure was applied aerially at rates of 0, 7.5, 30, or 75 g (AI)/ha to replicated 16-ha forest plots. Significant decreases in male trap catch and in mating success for three different female types (lab females from a laboratory colony, wild females pupae obtained from the field, adults emerged in the laboratory, then replaced in the field, and natural females occurring naturally in the test plot) were observed with increasing disruptant dose. Although degree of mating success was highly correlated for all three female types, differences among female types in slope, intercept, and linear and quadratic relationships were observed. Generally, plots having higher populations (as measured by larval counts) among replicate plots for each dose also had increased mating for all female types. The flake formulation was easily applied and provided season-long mating disruption. *Journal of economic entomology*. Feb 1988. v. 81 (1). p. 268-273. Includes references. (NAL Call No.: DNAL 421 J822).

1408

**Effect of aerial spraying with Dimilin, Dipel, or Gypchek on two natural enemies of the gypsy moth (Lepidoptera: Lymantriidae).**

JEENAI. Webb, R.E. Shapiro, M.; Podgwaite, J.D.; Reardon, R.C.; Tatman, K.M.; Venables, L.; Kolodny-Hirsch, D.M. Lanham, Md. : Entomological Society of America. The effects of three aerially applied insecticides on the incidence of two components of the natural enemy complex of the gypsy moth, *Lymantria dispar* (L.), were evaluated for the 1987 year of application. Application of Gypchek, a registered formulation of the gypsy moth nuclear polyhedrosis virus (NPV), initiated a large early-season (first-wave) epizootic of NPV; late-season NPV (second-wave) levels were higher in plots treated with Gypchek than in control plots, but not significantly so, whereas levels of the parasitoid *Cotesia melanoscela* (Ratzeburg) were significantly reduced in Gypchek-treated plots compared with control plots. Application of Dipel (*Bacillus thuringiensis* Berliner) resulted in a significant increase in numbers of *C. melanoscela*. Application of either Dipel or Dimilin (diflubenzuron) resulted in a significant decrease in incidence of NPV compared with control plots. Numbers of *C. melanoscela* in plots treated with Dimilin were not significantly different from those detected in control plots. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1695-1701.

Includes references. (NAL Call No.: DNAL 421 J822).

1409

**Effect of burlap bands on between-tree movement of late-instar gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae).**

EVETEX. Liebhold, A.M. Elkinton, J.S.; Wallner, W.E. College Park, Md. : Entomological Society of America. *Environmental entomology*. Apr 1986. v. 15 (2). p. 373-379. Includes references. (NAL Call No.: DNAL QL461.E532).

1410

**Effect of constant- and variable-humidity and temperature regimes on the survival and developmental periods of *Oligonychus ununguis* (Acarina: Tetranychidae) and *Neoseiulus fallacis* (Acarina: Phytoseiidae).**

EVETEX. Kramer, D.A. Hain, F.P. Lanham, Md. : Entomological Society of America. This study focused on the effects of constant- and variable-humidity and temperature regimes on the developmental periods of the spruce spider mite, *Oligonychus ununguis* (Jacobi), and a predator of this mite, *Neoseiulus fallacis* (Garman). Variable-humidity regimes, either alone or with variable-temperature regimes, had no significant effect on the developmental period of the immature stages of *O. ununguis*. Survival was marginally decreased under variable-temperature regimes. Temperature was the overriding influence for development of this mite. Developmental periods of *N. fallacis* immatures, however, were markedly increased by the use of a constant-humidity regime with a constant-temperature regime. In addition, survival of the immatures was low under low constant-humidity regimes. The effects of a range of constant-humidity regimes over a range of constant-temperature regimes on the survival and developmental period of *N. fallacis* eggs also were studied. Humidity was found to have a statistically significant but biologically trivial effect on the egg developmental period at the lower temperatures. However, when the vapor pressure deficit was high, there was a significant relationship between egg survival and vapor pressure deficit. The data suggest that the meteorological conditions in the field during the hot, dry summer months may not support a large population of *N. fallacis* and thereby allow *O. ununguis* populations to build up during these months. *Environmental entomology*. Oct 1989. v. 18 (5). p. 741-746. Includes references. (NAL Call No.: DNAL QL461.E532).

1411

**Effect of diflubenzuron on the canopy arthropod community in a central appalachian forest.**

JEENAI. Martinat, P.J. Coffman, C.C.; Dodge, K.; Cooper, R.J.; Whitmore, R.C. Lanham, Md. : Entomological Society of America. Little is known of the effects of diflubenzuron on the



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nontarget forest arthropod community. We hypothesized that the use of this compound in gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), control may cause indiscriminate reduction of nontarget arthropods. This, in turn, might be an important loss of food for forest birds and small mammals. In a 2-yr replicated study we sampled canopy arthropods with pole pruners for up to 3 mo following application of diflubenzuron. Due to a strong trend over time and large between-tree variance in canopy arthropod abundance and taxonomic richness, intensive sampling was required to reveal the treatment effect. Besides reductions in gypsy moth larvae, significant reductions due to diflubenzuron application were found mainly in canopy macrolepidoptera and non-lepidopteran mandibulate herbivores. Sucking herbivorous insects, microlepidoptera, and predaceous arthropods were not affected. *Journal of economic entomology*. Feb 1988. v. 81 (1). p. 261-267. Includes references. (NAL Call No.: DNAL 421 J822).

1412

**Effect of dosage and ratio of sex pheromone components on behavior of *Chrysoteuchia topiaria* (Zeller) (Lepidoptera: Pyralidae).**  
EVETEX. Kamm, J.A. McDonough, L.M.; Rowe, K.E. Lanham, Md. : Entomological Society of America. When the dosage of the primary pheromone component (Z)-11-hexadecenal (Z11-16:A1) of the cranberry girdler, *Chrysoteuchia topiaria* (Zeller), was varied from 0.03 to 10 mg in field tests, maximum catch was obtained at a dosage of less than 1 mg. When (Z)-9-hexadecenal (Z9-16:A1) was present at 0.3, 1, or 3% of Z11-16:A1, trap catch was proportional to the logarithm of the dosage over the same concentration range. The amount of Z9-16:A1 that produced maximum trap catches within calculated confidence limits of each dosage ranged from 0.2 to 2.1% when the dosages of Z11-16:A1 were 0.3, 1, 3, and 10 mg. Z9-16:A1 at 1% always was included within the confidence limits of these dosages. The two higher dosages captured significantly more males than the two lower dosages, but trap catches were not significantly different between dosages of 0.3-1 and 3-10 mg. The reduced trap catch by Z11-16:A1 alone for dosages above 1 mg was the result of the absence of an important pheromone component. In flight tunnel studies, Z11-16:A1 induced limited plume-oriented flight (19% of tested males) at a dosage of 0.03 mg only, and males did not reach the source. The percentage of males exhibiting upwind flight in the plume increased dramatically when Z9-16:A1 was present. At a dosage of 0.3 mg, upwind flight in the plume was 0% for the single component and 90% for the two components. Maximum upwind flight occurred at dosages from 0.03 to 3 mg and, as occurred in field tests, the Z9-16:A1 at 1% of Z11-16:A1 always was included within the calculated confidence limits for these dosages. The 3-mg dosage of Z11-16:A1 reduced the number of males landing on the septa. *Environmental entomology*. June 1989. v. 18 (3). p. 368-372. Includes references. (NAL Call No.: DNAL QL461.E532).

1413

**The effect of *Erynia radicans* on food consumption, utilization and fecundity by the spruce budworm, *Choristoneura fumiferana*.**  
XGNEA. Mohamed, A.K.A. Lewis, L.; Lewis, D. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 77-81. Includes references. (NAL Call No.: DNAL aSD11.U56).

1414

**Effect of experience on the responses of the parasitoid *Brachymeria intermedia* (Hymenoptera: Chalcididae) to its host, *Lymantria dispar* (Lepidoptera: Lymantriidae), and to kairomone.**  
AESAAI. Carde, R.T. Lee, H.P. Lanham, Md. : The Society. *Annals of the Entomological Society of America*. Sept 1989. v. 82 (5). p. 653-657. ill. Includes references. (NAL Call No.: DNAL 420 EN82).

1415

**Effect of height on responses of redheaded pine sawfly (Hymenoptera: Diprionidae) males to synthetic pheromone and virgin females.**  
EVETEX. Wilkinson, R.C. Chappelka, A.H. III; Kraemer, M.E.; Coppel, H.C.; Mastsumura, F. College Park, Md. : Entomological Society of America. *Environmental entomology*. Oct 1987. v. 16 (5). p. 1152-1156. Includes references. (NAL Call No.: DNAL QL461.E532).

1416

**Effect of humidity and cold storage on diapause termination of hickory shuckworm larvae.**  
SENTD. Gunasena, G.H. Harris, M.K. College Station, Tex. : Southwestern Entomological Society. *The Southwestern entomologist*. Mar 1987. v. 12 (1). p. 24-31. Includes references. (NAL Call No.: DNAL QL461.S65).

1417

**Effect of juvenile hormone analog, fenoxycarb, on pheromone production by *Ips paraconfusus* (Coleoptera: Scolytidae).**  
JCECD. Chen, N.M. Borden, J.H.; Pierce, H.D. Jr. New York, N.Y. : Plenum Press. *Journal of chemical ecology*. Apr 1988. v. 14 (4). p. 1087-1098. Includes references. (NAL Call No.: DNAL QD415.A1J6).



1418

**Effect of *Nosema fumiferanae* (Microsporida) on fecundity, fertility, and progeny performance of *Choristoneura fumiferana* (Lepidoptera: Tortricidae).**

EVETEX. Bauer, L.S. Nordin, G.L. Lanham, Md. : Entomological Society of America. Female eastern spruce budworm, *Choristoneura fumiferana* (Clemens), inoculated sublethally as fourth or fifth instars with *Nosema fumiferanae* (Thomson), exhibited significant reductions in size, fecundity, and total egg complement. Mating success and egg fertility were similar for treated and control insects. The presence of disease improved the positive correlation between fecundity or total egg complement and female pupal weight without significantly reducing the slope. Total egg complement was negatively correlated with disease load. A subsample of progeny reared from each fertile mating indicates 100% transovarial transmission efficiency at the spore dosages provided. Diseased progeny experienced twice the larval mortality, and surviving individuals were approximately 25% smaller and took 17% longer to complete development than healthy progeny. Maternal disease load was a significant, positive factor in percentage progeny mortality and male pupal weight. Environmental entomology. Apr 1989. v. 18 (2). p. 261-265. Includes references. (NAL Call No.: DNAL QL461.E532).

1419

**Effect of pandora moth (Lepidoptera: Saturniidae) defoliation on growth of ponderosa pine in Arizona.**

JEENAI. Miller, K.K. Wagner, M.R. Lanham, Md. : Entomological Society of America. Defoliation of ponderosa pine, *Pinus ponderosa* Douglas ex Lawson and Lawson, by the pandora moth, *Coloradia pandora* Blake, results in a significant reduction in basal area growth compared with undefoliated trees. A high proportion (83%) of heavily defoliated trees produced no growth in the year following defoliation. Heavily defoliated trees produced more growth than moderately defoliated trees one year after the last defoliation. Overall, tree growth is not related linearly to defoliation intensity. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1682-1686. Includes references. (NAL Call No.: DNAL 421 J822).

1420

**Effect of pine oil on landing and attack by the southern pine beetle (Coleoptera: Scolytidae).**

JESCEP. O'Donnell, B.P. Payne, T.L.; Walsh, K.D. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Oct 1986. v. 21 (4). p. 319-321. (NAL Call No.: DNAL QL461.G4).

1421

**Effect of pinewood nematode density on tethered flight of *Monochamus carolinensis* (Coleoptera: Cerambycidae).**

EVETEX. Lanham, Md. : Entomological Society of America. *Monochamus carolinensis* (Olivier) beetles infested with the pinewood nematode, *Bursaphelenchus xylophilus*, were tethered and flown upon emergence from host logs. The mean (+/-SD) number of nematodes carried per beetle was, 7,933, (+/-16,997) with a mean flight time of 18.6 (+/-11.4) min. Larger beetles exhibited longer flights and carried more nematodes. The density of nematodes in the beetle had a slight negative influence on flight capability. The sex of the beetle had no effect on flight duration or the number of nematodes carried. Environmental entomology. Aug 1989. v. 18 (4). p. 670-673. Includes references. (NAL Call No.: DNAL QL461.E532).

1422

**Effect of plant resistance, competition, and enemies on a leaf-galling sawfly (Hymenoptera: Tenthredinidae).**

EVETEX. Clancy, K.M. Price, P.W. Lanham, Md. : Entomological Society of America. The relative importance of three sources of larval mortality (host plant resistance, intraspecific competition, and natural enemies) was evaluated for a population of leaf-galling sawflies, *Pontania* sp., near *P. pacifica* Marlatt, on arroyo willow, *Salix lasiolepis* Benth., at a site in Flagstaff, Ariz., from 1981 to 1984. The ratio of the percentage of sawfly larvae killed by natural enemies to the percentage lost to host plant defenses (i.e., abortion, defined as an aborted formation of a gall resulting from death of the egg or small larva) was 1.53:1. Mortality from abortion was divided into a host plant resistance component (constitutive abortion, e.g., a plant resistance factor preventing establishment of the egg or small larva) and an intraspecific competition-mediated component (because abortion increased as within-leaf gall densities rose). Natural enemies caused twice as much mortality as plant resistance and 6.36 times greater mortality than intraspecific competition. These results support the hypothesis that third-trophic-level effects exert a stronger selective pressure on many insect populations than competition for limiting resources. There was evidence that intraspecific competition for limiting food resources occurred for these *Pontania* sp. sawflies; increased within-leaf gall densities had a density-dependent, linear, negative effect on gall size, and consequently, on larval biomass because sawfly size was positively correlated with gall size. However, only about 3% of the variation in gall size was explained by within-leaf gall density. Thus, gall (and larval) size were only weakly affected by intraspecific competition. Environmental entomology. Apr 1989. v. 18 (2). p. 284-290. Includes references. (NAL Call No.: DNAL QL461.E532).



## (PESTS OF PLANTS - INSECTS)

1423

**Effect of prey density on diurnal activity and ovarian development in *Calosoma calidum* (Coleoptera: Carabidae): implications for biological control of the gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae) in the Midwest.**

GRLEA. Jeffords, M.R. Case L.J. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Summer 1987. v. 20 (2). p. 93-97. Includes references. (NAL Call No.: DNAL QL461.M5).

1424

**Effect of selected chemicals on non-suberized impervious tissue (NIT) formation in Fraser fir.**

GENSAB. Arthur, F.H. Hain, F.P. Tifton, Ga. : The Society. Journal of Entomological Science. July 1985. v. 20 (3). p. 305-311. Includes references. (NAL Call No.: DNAL QL461.G4).

1425

**Effect of simulated insect damage on growth and survival of northern red oak (*Quercus rubra* L.) seedlings.**

EVETEX. Wright, S.L. Hall, R.W.; Peacock, J.W. Lanham, Md. : Entomological Society of America. Effects of simulated insect damage--artificial defoliation and root damage in combination with two levels of watering--were studied to determine the potential effect on northern red oak seedlings (*Quercus rubra* L.). Treatments and treatment combinations caused significant differences in stem diameter, percentage of stem dieback, and mortality. Defoliation and a regime of decreased watering seemed to have the greatest effect on seedling growth and mortality. Root injury had no consistent direct effect, but interacted significantly with other factors. Insect damage to foliage and roots, together with water stress, may be a factor in poor survival of oak seedlings under field conditions. Environmental entomology. Apr 1989. v. 18 (2). p. 235-239. Includes references. (NAL Call No.: DNAL QL461.E532).

1426

**Effect of *Taxus* foliage and extract on the toxicity of some pyrethroid insecticides to adult black vine weevil (Coleoptera: Curculionidae).**

JEENAI. Shanks, C.H. Jr. Chamberlain, J.D. Lanham, Md. : Entomological Society of America. The pyrethroid insecticides fenvalerate, permethrin, and fluvalinate were more toxic to adult black vine weevil; *Otiorhynchus sulcatus* (F.), on yew, *Taxus media* Rehder, foliage rather than on leaves of strawberry, *Fragaria x ananassa* Duchesne, or cranberry, *Vaccinium macrocarpon* Ait. Feeding weevils untreated yew foliage or an ethanolic extract of yew needles for 24 h before placing them on fenvalerate-treated strawberry leaves greatly

increased knockdown. Host plant species must be considered when pyrethroids are used for control of adult black vine weevil. Journal of economic entomology. Feb 1988. v. 81 (1). p. 98-101. Includes references. (NAL Call No.: DNAL 421 J822).

1427

**Effect of thinning damage on bark beetle susceptibility indicators in loblolly pine.**

Blanche, C.A. Nebeker, T.E.; Hodges, J.D.; Karr, B.L.; Schmitt, J.U. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 471-479. Includes references. (NAL Call No.: DNAL aSD11.U57).

1428

**Effect of two insecticides on abundance of insect families associated with Siberian elm windbreaks.**

JKESA. Frye, R.D. Dix, M.E.; Carey, D.R. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1988. v. 61 (3). p. 278-284. Includes references. (NAL Call No.: DNAL 420 K13).

1429

**Effect of verbenone on response of *Dendroctonus brevicomis* to exo-brevicomin, frontalin, and myrcene.**

JCECD. Tilden, P.E. Bedard, W.D. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1988. v. 14 (1). p. 113-122. Includes references. (NAL Call No.: DNAL QD415.A1U6).

1430

**Effect of within-leaf density and leaf size on pupal weight of a leaf-miner, *Cameraria* (Lepidoptera: Gracillariidae).**

SWNAA. Bultman, T.L. Faeth, S.H. Austin : Southwestern Association of Naturalists. The Southwestern naturalist. May 22, 1986. v. 31 (2). p. 201-206. Includes references. (NAL Call No.: DNAL 409.6 S08).

1431

**Effective residual life of carbaryl for protecting ponderosa pine from attack by the western pine beetle (Coleoptera: Scolytidae).**

JEENAI. Haverty, M.I. Shea, P.J.; Hall, R.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1985. v. 78 (1). p. 197-199. Includes references. (NAL Call No.: DNAL 421 J822).

## (PESTS OF PLANTS - INSECTS)

1432

**Effectiveness of carbaryl and acephate in reducing damage by *Petrova metallica* (Busck) (Lepidoptera: Tortricidae) in ponderosa pine windbreaks.**

XARRA. Dix, M.E. Fort Collins, Colo. : The Station. USDA Forest Service research note RM - United States, Rocky Mountain Forest and Range Experiment Station. Oct 1985. (458). 3 p. Includes references. (NAL Call No.: DNAL A99.9 F7632US).

1433

**Effects of a nuclear polyhedrosis virus isolate from *Malacosoma disstria* on *Lymantria dispar* larval growth pattern.**

JIVPA. Stairs, G.R. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. Mar 1989. v. 53 (2). p. 247-250. Includes references. (NAL Call No.: DNAL 421 J826).

1434

**Effects of abamectin and milbemycin D on gypsy moth (Lepidoptera: Lymantriidae).**

JEENAI. Deecher, D.C. Brezner, J.; Tanenbaum, S.W. Lanham, Md. : Entomological Society of America. Effects of abamectin and milbemycin D on gypsy moth, *Lymantria dispar* L., were determined. Fifty percent of third instars exposed for 2 h to 5.2 ppm milbemycin D on artificial diet were flaccid and paralyzed, whereas larvae exposed to 5.0 ppm abamectin were unaffected. When larvae were exposed to abamectin on artificial diet for 24 or 48 h, 50% of third instars died. Larvae exposed for 24 h to milbemycin D were not affected, but at 48 h 165 ppm caused 50% mortality of third instars. When larvae were exposed to milbemycin D residues for 48 h and observed 5 d later, the LC50 was 92 ppm. LC50's (ppm) when larvae were exposed for 72 h to residues on poplar foliage were 4 for abamectin, 1,454 for milbemycin D, and 125 for carbaryl. Five days after exposure to foliage residues, LC50's (ppm) were 1 for abamectin, 244 for milbemycin D and 106 for carbaryl. On both substrates, abamectin was most toxic to third instars. Larvae exposed for 2 h to milbemycin D residues were flaccid and paralyzed but the effect was reversible. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1395-1398. Includes references. (NAL Call No.: DNAL 421 J822).

1435

**Effects of aerial detection schedules on the age of southern pine beetle infestations.**

FOSCA. De Steiguer, J.E. Hedden, R.L. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1988. v. 34 (1). p. 229-235. Includes references. (NAL Call No.: DNAL 99.8 F7632).

1436

**Effects of *Bacillus thuringiensis* on parasites of western spruce budworm (Lepidoptera: Tortricidae).**

JEENAI. Niwa, C.G. Stelzer, M.J.; Beckwith, R.C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1987. v. 80 (4). p. 750-753. Includes references. (NAL Call No.: DNAL 421 J822).

1437

**Effects of *Bacillus thuringiensis* treatments on the occurrence of nuclear polyhedrosis virus in gypsy moth (Lepidoptera: Lymantriidae) populations.**

JEENAI. Woods, S.A. Elkinton, J.S.; Shapiro, M. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1706-1714. Includes references. (NAL Call No.: DNAL 421 J822).

1438

**Effects of birds on spruce budworm populations - a progress report.**

Crawford, H.S. Jennings, D.T. Orono, Me. : The Station. Miscellaneous publication - University of Maine, Agricultural Experiment Station. Paper presented at the "Joint Conference of New England Chapter of the Society of American Foresters, Maine Chapter of the Wildlife Society, Atlantic International Chapter of the American Fisheries Society," March 6-8, 1985, Portland, Maine. Apr 1986. (689). p. 315-321. Includes references. (NAL Call No.: DNAL 100 M28S (2)).

1439

**Effects of defoliation by the western false hemlock looper on Douglas-fir tree-ring chronologies.**

TRBUA. Alfaro, R.I. MacDonald, R.N. Tucson, Ariz. : Tree-Ring Society. Tree-ring bulletin. 1988. v. 48. p. 3-11. Includes references. (NAL Call No.: DNAL 99.8 T713).

1440

**Effects of Dimilin on diversity and abundance of forest birds.**

Stribling, H.L. Smith, H.R. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Mar 1987. v. 4 (1). p. 37-38. Includes references. (NAL Call No.: DNAL SD143.N6).



## (PESTS OF PLANTS - INSECTS)

1441

**Effects of drainage and severe defoliation on the rawfiber content of balsam fir needles and growth of the spruce budworm (Lepidoptera: Tortricidae).**

EVETEX. Bauce, E. Hardy, Y. College Park, Md. : Entomological Society of America. Analysis of rawfiber content of balsam fir, *Abies balsamea* (L.) Mill., needles in conjunction with laboratory-reared larvae of spruce budworm, *Choristoneura fumiferana* (Clemens), during the 1985 growing season indicated significant variations in the quality of food available for consumption by the insect. Two consecutive years of defoliation as well as poor drainage were directly related to higher rawfiber content of the current year's foliage which, in turn, caused a decrease in pupal weight, larval development rate, and survival. Environmental entomology. Aug 1988. v. 17 (4). p. 671-674. Includes references. (NAL Call No.: DNAL QL461.E532).

1442

**Effects of food, temperature, and breeding conditions on the life span of adults of three cohabitating bark beetle (Scolytidae) parasitoids (Hymenoptera).**

EVETEX. Mendel, Z. College Park, Md. : Entomological Society of America. The study deals with the adult life span of three hymenopterous parasitoids of bark beetles (Scolytidae)--*Dendrosoter caenopachoides* Ruschka, *D. protuberans* Nees (Braconidae), and *Metacolus unifasciatus* Foerster (Pteromalidae)--investigated under three temperature and two nutrition treatments. Longevity decreased significantly with increasing temperature and absence of carbohydrate in the diet. Regardless of species, life span was about 2 mo with honey plus water at 18 degrees C compared with 20-30 d at 30 degrees C; with water only, the life span was 15-30 d at 18 degrees C and dropped to about 4-8 d at 30 degrees C. Longevity was significantly related to body length of males and females of all tested species when kept on water, but usually not when honey was available. Marked differences between longevities in the same species were attributed to breeding conditions (i.e., differences in host size of parasitoids reared from scolytids of different size). Ecological and silvicultural implications of the findings are discussed. It is suggested that an increase in tree species diversity in the stands might have diversified and increased food sources for adult parasitoids. Environmental entomology. Apr 1988. v. 17 (2). p. 293-298. Includes references. (NAL Call No.: DNAL QL461.E532).

1443

**Effects of frontalure in suppressing southern pine beetle spot growth under endemic and epidemic population levels.**

Payne, T.L. Kudon, L.H.; Benisford, C.W.; O'Donnell, B.P.; Walsh, D.K. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 281-285. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

1444

**Effects of grand fir monoterpenes on the fir engraver, *Scolytus ventralis* (Coleoptera: Scolytidae), and its symbiotic fungus.**

EVETEX. Raffa, K.F. Berryman, A.A.; Simasko, J.; Teal, W.; Wong, B.L. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1985. v. 14 (5). p. 552-556. Includes references. (NAL Call No.: DNAL QL461.E532).

1445

**Effects of insecticides on forest structure.**

Trial, H. Jr. Orono, Me. : The Station. Miscellaneous publication - University of Maine, Agricultural Experiment Station. Paper presented at the "Joint Conference of New England Chapter of the Society of American Foresters, Maine Chapter of the Wildlife Society, Atlantic International Chapter of the American Fisheries Society," March 6-8, 1985, Portland, Maine. Apr 1986. (689). p. 309-314. Includes references. (NAL Call No.: DNAL 100 M28S (2)).

1446

**Effects of intertrap distance and wind direction on the interaction of gypsy moth (Lepidoptera: Lymantriidae) pheromone-baited traps.**

EVETEX. Elkinton, J.S. Carde, R.T. Lanham, Md. : Entomological Society of America. More male gypsy moths, *Lymantria dispar* L., were captured in traps at the perimeter compared with traps at the center of a 6- X -6 grid of pheromone traps spaced every 80 m. Additional tests demonstrated suppression of catch at the center of hexagonal arrays of traps with intertrap distances ranging from 2.5 to 40 m. In a hexagonal array of traps spaced every 20 m and monitored every 1-3 h, more males were captured in upwind and downwind traps than in crosswind or central traps. Environmental entomology. Oct 1988. v. 17 (5). p. 764-769. Includes references. (NAL Call No.: DNAL QL461.E532).



1447

Effects of light on location of host egg masses by *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae), an egg parasite of gypsy moth (Lepidoptera: Lymantriidae). EVETEX. Odell, T.M. Chang, P.Y.; Walton, G.S. Lanham, Md. : Entomological Society of America. The effect of light on host finding and parasitism by *Ooencyrtus kuvanae* (Howard), an egg parasitoid of gypsy moth, *Lymantria dispar* L., was studied in the laboratory. Parasitism by *O. kuvanae* females confined in light or dark cylinders was not significantly different. When parasites were given a choice between light or dark chambers, significantly more chose the light chamber regardless of the presence or absence of an egg mass. However, chambers were significantly more attractive when they contained an egg mass, indicating that an egg mass contributes to host location over short distances. Parasitism of egg masses in dark chambers in which no *O. kuvanae* were found demonstrates that the parasite may leave these sites after oviposition. Implications for success of *O. kuvanae* in low-density gypsy moth populations are discussed. Environmental entomology. Dec 1989. v. 18 (6). p. 1101-1104. Includes references. (NAL Call No.: DNAL QL461.E532).

1448

Effects of microwave treatment of live oak acorns on germination and on *Curculio* sp. (Coleoptera: Curculionidae) larvae. JEENAI. Crocker, R.L. Morgan, D.L.; Longnecker, M.T. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1987. v. 80 (4). p. 916-920. Includes references. (NAL Call No.: DNAL 421 J822).

1449

Effects of moisture before and after laboratory spray application of insecticides to western spruce budworm (Lepidoptera: Tortricidae). JEENAI. Robertson, J.L. Preisler, H.K. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1678-1680. Includes references. (NAL Call No.: DNAL 421 J822).

1450

Effects of mycangial fungi on gallery construction and distribution of bluestain in southern pine beetle-infested pine bolts. GENSAB. Bridges, J.R. Perry, T.J. Tifton, Ga. : The Society. Journal of Entomological Science. Apr 1985. v. 20 (2). p. 271-275. ill. Includes references. (NAL Call No.: DNAL QL461.G4).

1451

Effects of outbreaks and management responses on big game and other wildlife. XGTIA. Light, J.T. Burbridge, W.B. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Apr 1985. (174). p. 37-43. ill. (NAL Call No.: DNAL aSD11.A48).

1452

Effects of previous stand management of mortality following gypsy moth defoliation. XFGTA. Gottschalk, K.W. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 296. (NAL Call No.: DNAL aSD11.A352).

1453

Effects of previous stand management on mortality following gypsy moth defoliation: preliminary results. Gottschalk, K.W. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 573-578. Includes references. (NAL Call No.: DNAL aSD11.U57).

1454

Effects of short-term phenological changes in leaf suitability on the survivorship, growth, and development of gypsy moth (Lepidoptera: Lymantriidae) larvae. EVETEX. Raupp, M.J. Werren, J.H.; Sadof, C.S. College Park, Md. : Entomological Society of America. In this report we examine the effects of short-term phenological changes in host suitability on the performance of gypsy moth, *Lymantria dispar* (L.), larvae. The time frame examined was a 2-wk period during which most gypsy moth larvae hatch and feed in central Maryland. Oak supported high levels of survivorship for almost 2 wk, and beech remained suitable for young larvae for less than 1 wk; hickory and maple were intermediate. Larvae did not respond uniformly to chronological changes in foliage when fed leaves from different tree species. When fed oak, larvae tended to develop more slowly as the season progressed. This trend was less important for hickory. Also, differences in pupal weight were observed for female larvae fed different hosts--oak produced pupae of greater weight; this trend was less pronounced for male larvae. Phenological differences in host suitability may help explain associations of gypsy moth with particular tree species that are commonly observed in the field.



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Environmental entomology. Apr 1988. v. 17 (2). p. 316-319. Includes references. (NAL Call No.: DNAL QL461.E532).

1455

### **Effects of silvicultural practice on bird predation.**

XGNEA. Crawford, H.S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 173-175. Includes references. (NAL Call No.: DNAL aSD11.U56).

1456

### **Effects of simulated acid rain, ozone and sulfur dioxide on suitability of elms for elm leaf beetle.**

JOARD. Hall, R.W. Barger, J.H.; Townsend, A.M. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Mar 1988. v. 14 (3). p. 61-66. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

1457

### **Effects of slash pine phloem nutrition on the reproductive performance of *Ips calligraphus* (Coleoptera: Scolytidae).**

EVETEX. Popp, M.P. Wilkinson, R.C.; Jokela, E.J.; Harding, R.B.; Phillips, T.W. Lanham, Md. : Entomological Society of America. The density of eggs laid per centimeter of gallery by laboratory-reared *Ips calligraphus* (Germar) females was determined following introduction into thin phloem bolts cut from 25-yr-old slash pine, *Pinus elliotii* Engelm. var. *elliottii*, that had been fertilized at the time of planting with a combination of nitrogen, phosphorus, and potassium, or phosphorus alone. Egg density was negatively correlated with female pronotal width (size) and positively correlated with the phloem phosphorus concentration. These two variables explained 64% of the variation in egg density. It is hypothesized that altering egg density in response to varying phloem nutrition represents a resource partitioning mechanism that reduces larval competition. These results also suggest that excessive phosphorus fertilization of slash pine on the Coastal Plain soils could contribute to a build-up in the beetle population without the added benefits of stand growth. Environmental entomology. Oct 1989. v. 18 (5). p. 795-799. Includes references. (NAL Call No.: DNAL QL461.E532).

1458

### **Effects of stand conditions on parasitoid dynamics.**

XGNEA. Hanson, P.M. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 177-183. Includes references. (NAL Call No.: DNAL aSD11.U56).

1459

### **Effects of terpenoid compounds on growth of symbiotic fungi associated with the southern pine beetle.**

PHYTAJ. Bridges, J.R. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Jan 1987. v. 77 (1). p. 83-85. Includes references. (NAL Call No.: DNAL 464.8 P56).

1460

### **Effects of thinning in reducing stand risk to southern pine beetle in the Georgia Piedmont.**

XFGSA. Price, T.S. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 12-15. maps. Includes references. (NAL Call No.: DNAL aSD433.A53).

1461

### **Effects of three insect growth regulators, feeding substrates, and colony origin on survival and presoldier production of the formosan subterranean termite (Isoptera: Rhinotermitidae).**

JEENAI. Su, N.Y. Tamashiro, M.; Haverty, M.I. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1985. v. 78 (6). p. 1259-1263. Includes references. (NAL Call No.: DNAL 421 J822).

1462

### **Efficacy and economics of selected systemic insecticides for control of *Phoracantha semipunctata* (Coleoptera: Cerambycidae), a new pest in North America.**

JEENAI. Ali, A.D. Garcia, J.M. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1124-1127. Includes references. (NAL Call No.: DNAL 421 J822).

1463

**Efficient monitoring for an urban IPM program.**  
JOARD. Ball, J. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. July 1987. v. 13 (7). p. 174-177. Includes references. (NAL Call No.: DNAL SB436.J6).

1464

**Egg contamination as a method for the inoculative release of exotic microsporidia of the gypsy moth.**

JIVPA. Jeffords, M.R. Maddox, J.V.; McManus, M.L.; Webb, R.E.; Wieber, A. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. May 1988. v. 51 (3). p. 190-196. Includes references. (NAL Call No.: DNAL 421 J826).

1465

**Electroantennogram responses by mountain pine beetles, *Dendroctonus ponderosae* Hopkins, exposed to selected semiochemicals.**

JCECD. Whitehead, A.T. New York, N.Y. : Plenum Press. Journal of chemical ecology. July 1986. v. 12 (7). p. 1603-1621. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1466

**Elevated parasitism in artificially augmented populations of *Lymantria dispar* (Lepidoptera: Lymantriidae).**

EVETEX. Liebhold, A.M. Elkinton, J.S. Lanham, Md. : Entomological Society of America. Within 1-ha plots, gypsy moth, *Lymantria dispar* L., densities were artificially elevated from low densities (about 20 egg masses/ha) to high densities (8,000 egg masses/ha) using field-collected eggs and F1 sterile laboratory-reared eggs. At all sites, including the feral and sterile release areas, densities decreased to undetectable levels (less than 10 egg masses/ha). In the sterile and feral release areas, parasitism by *Cotesia melanoscela* (Ratzeburg) was the largest source of identified mortality and was significantly greater than in the surrounding area or in untreated plots. Within the feral release area, parasitism by *Compsilura concinnata* (Meigen) and *Parasetigena silvestris* (Robineau-Desvoidy) was substantial and was greater than in the surrounding area. This pattern was not observed in the sterile release area. This difference may have been caused by differences in gypsy moth phenologies between the two populations. Spatially density-dependent mortality caused by parasitoids is hypothesized to be important in the regulation of low-density populations. Furthermore, this mortality may have profound effects on attempts to suppress populations using releases of induced-inherited sterile insects. Environmental entomology. Dec 1989. v. 18 (6). p. 986-995. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

1467

**Elicitation of defensive reactions in conifers.**

Lieutier, F. Berryman, A.A. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 313-319. ill. Includes references. (NAL Call No.: DNAL SB761.M46).

1468

**Endemic and epidemic populations of southern pine beetle: implications of the two-phase model for forest managers.**

FOSCA. Mawby, W.D. Hain, F.P.; Doggett, C.A. Bethesda, Md. : Society of American Foresters. Typical of many *Dendroctonus* species, the southern pine beetle (*D. frontalis* Zimmerman) exhibits dramatic fluctuations in population levels. Using field observations of beetle damage, this study empirically demonstrates that a two-phase model described for mountain pine beetle (*D. ponderosae* Hopkins) is appropriate for southern pine beetle at each of five hierarchical levels: the tree, the local infestation, the county, the state, and the region. The model has three points that represent a stable low-level (endemic) phase maintained by host-tree-defensive capabilities, a transient high-level (epidemic) phase determined by the availability of host material, and a threshold between the two phases. The threshold depends on local environmental and biotic factors and is a rarely observed phenomenon. Implications of these results for southern pine beetle management and control are discussed. The necessity for establishing and maintaining control programs during the endemic phase is stressed. Forest science. Dec 1989. v. 35 (4). p. 1075-1087. Includes references. (NAL Call No.: DNAL 99.8 F7632).

1469

**Energetics of pine defense systems to bark beetle attack.**

Sharpe, P.J.H. Wu, H.I.; Cates, R.G.; Coeschl, J.D. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 206-223. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

1470

**Enhancement of baculovirus activity on gypsy moth (Lepidoptera: Lymantriidae) by chitinase.**

JEENAI. Shapiro, M. Preisler, H.K.; Robertson, J.L. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1113-1116. Includes references. (NAL Call No.: DNAL 421 J822).



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1471

**Enhancement of baculovirus activity on gypsy moth (*Lepidoptera: Lymantriidae*) by chitinase.**  
JEENAI. Shapiro, M. Preisler, H.K.; Robertson, J.L. Lanham, Md. : Entomological Society of America. Chitinase significantly enhanced the activity of nuclear polyhedrosis viruses (NPV) ingested by second-instar gypsy moth, *Lymantria dispar* (L.). Multiple probit regressions calculated from mortality observed at 14 and 21 d indicated that the LC50's of NPV declined 1.3-, 2.0-, 3.2-, and 5.4-fold with the addition of 0.001, 0.010, 0.10, and 1.00% chitinase, respectively. In addition, insects exposed to NPV-chitinase combinations died more rapidly than those that ingested NPV only. *Journal of economic entomology*. Dec 1987. v. 80 (6). p. 1113-1116. Includes references. (NAL Call No.: DNAL 421 J822).

1472

**Enniatins from *Fusarium avenaceum* isolated from balsam fir foliage and their toxicity to spruce budworm larvae, *Choristoneura fumiferana* (Clem.) (*Lepidoptera: Tortricidae*).**  
JCECD. Strongman, D.B. Strunz, G.M.; Giguere, P.; Yu, C.M.; Calhoun, L. New York, N.Y. : Plenum Press. *Journal of chemical ecology*. Mar 1988. v. 14 (3). p. 753-764. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1473

**Entomological problems in growing white pine.**  
GTRWD. Houseweart, M.W. Knight, F.B. Washington, D.C. : The Service. General technical report WD - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 89-92. Includes references. (NAL Call No.: DNAL aSD11.U52).

1474

**Environmental contamination of egg masses as a major component of transgenerational transmission of gypsy moth nuclear polyhedrosis virus (*LdMNPV*).**  
JIVPA. Murray, K.D. Elkinton, J.S. Duluth, Minn. : Academic Press. *Journal of invertebrate pathology*. May 1989. v. 53 (3). p. 324-334. Includes references. (NAL Call No.: DNAL 421 J826).

1475

**Environmental fate of Dimilin 25-W in a Central Appalachian forest.**  
BECTA. Martinat, P.J. Christman, V.; Cooper, R.J.; Dodge, K.M.; Whitmore, R.C.; Booth, G.; Seide, G. New York, N.Y. : Springer-Verlag. *Bulletin of environmental contamination and toxicology*. July 1987. v. 39 (1). p. 142-149.

Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1476

**Environmental monitoring of spruce budworm suppression programs in the eastern United States and Canada an annotated bibliography.**  
MAMRA. Trial, J.G. Orono, Me. : The Station. Miscellaneous report - University of Maine Agricultural Experiment Station. Bibliography. Apr 1986. (312). 36 p. (NAL Call No.: DNAL 100 M28M).

1477

**Enzyme immunoassays for detection of gypsy moth nuclear polyhedrosis virus.**  
XGNEA. Ma, M. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 125-131. ill. Includes references. (NAL Call No.: DNAL aSD11.U56).

1478

**Evolutionary reduction of complex life cycles: loss of host-alternation in *Pemphigus* (*Homoptera: Aphididae*).**  
EVOLA. Moran, N.A. Whitham, T.G. Lawrence, Kan. : Society for the Study of Evolution. *Evolution*. July 1988. v. 42 (4). p. 717-728. ill. Includes references. (NAL Call No.: DNAL 443.8 EV62).

1479

***Erynia crustosa* zygospore germination.**  
MYCOAE. Perry, D.F. Fleming, R.A. Bronx, N.Y. : The New York Botanical Garden. *Mycologia*. Jan/Feb 1989. v. 81 (1). p. 154-158. ill. Includes references. (NAL Call No.: DNAL 450 M99).

1480

***Erynia radicans* as a mycoinsecticide for spruce budworm control.**  
XGNEA. Soper, R.S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 69-76. Includes references. (NAL Call No.: DNAL aSD11.U56).

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1481

### **Estimates of pre-settlement insect damage in Australian and North American forests.**

ECOLA. Morrow, P.A. Fox, L.R. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Aug 1989. v. 70 (4). p. 1055-1060. Includes references. (NAL Call No.: DNAL 410 EC7).

1482

### **Estimating and valuing western pine beetle impacts.**

FDSCA. Liebhold, A.M. Berck, P.; Williams, N.A.; Wood, D.L. Washington, D.C. : Society of American Foresters. Forest science. June 1986. v. 32 (2). p. 325-338. Includes references. (NAL Call No.: DNAL 99.8 F7632).

1483

### **Estimating oak leaf area index and gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), defoliation using canopy photographs.**

EVETEX. Liebhold, A.M. Elkinton, J.S.; Miller, D.R.; Wang, Y.S. College Park, Md. : Entomological Society of America. Abstract: Oak leaf area index (LAI) was estimated using wide-angle photographs of the forest canopy taken from the ground at grid points throughout three sites on Cape Cod, Mass. Confidence intervals for these estimates and optimal sample sizes were calculated. Oak LAI estimates leveled off by early June when no defoliation was present. Within-plot two-dimensional spatial distribution of oak LAI was very similar to the spatial distribution of oak basal area. Consequently, there was a positive correlation between local oak leaf area and local basal area. Comparison of LAI estimates taken before and after gypsy moth, *Lymantria dispar* (L.), defoliation allowed the estimation of oak leaf area consumed. Leaf area loss was similar in areas of high and low host foliage densities. The correlation of leaf area lost with local density of early instars was greater than the correlation with the density of late instars. Environmental entomology. June 1988. v. 17 (3). p. 560-566. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

1484

### **Estimating southern pine beetle caused timber losses over extensive areas.**

Ward, J.D. Dull, C.W.; Ryan, G.W.; Remion, M.C. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 34-40. ill., maps. Includes references. (NAL Call No.: DNAL aSD11.U57).

1485

### **Estimating the benefits of gypsy moth control on timberland.**

Gansner, D.A. Herrick, D.W. Broomall, Pa. : The Station. Forest Service research note NE-RN - Northeastern Forest Experiment Station, Forest Service, U.S. Department of Agriculture. July 1987. (337). 3 p. Includes references. (NAL Call No.: DNAL A99.9 F7622U).

1486

### **Estimating timber losses from a town ant colony with aerial photographs.**

SUAFD. Moser, J.C. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1986. v. 10 (1). p. 45-47. ill. Includes references. (NAL Call No.: DNAL SD1.S63).

1487

### **European hornet damage to ash and birch trees.**

JOARD. Santamour, F.S. Jr. Greene, A. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Nov 1986. v. 12 (11). p. 273-279. ill. Includes 16 references. (NAL Call No.: DNAL SB436.J6).

1488

### **Evaluating the impact of sequential releases of *Cotesia melanoscela* (Hymenoptera: Braconidae) on *Lymantria dispar* (Lepidoptera: Lymantriidae).**

EVETEX. Kolodny-Hirsch, D.M. Reardon, R.C.; Thorpe, K.W.; Raupp, M.J. College Park, Md. : Entomological Society of America. Laboratory-reared *Cotesia melanoscela* (Ratzeburg) were released sequentially over 3 wk at an average level of 12,000 females per ha in three isolated mixed-hardwood woodlots infested with gypsy moth on Maryland's Eastern Shore. Southwood's area under the curve method was used to estimate generational levels of parasitism for the first three instars of the gypsy moth and rates of parasitism were estimated from gypsy moth larvae collected from various canopy strata and host tree species. Significantly higher rates of generational parasitism were achieved in release woodlots (15.4%) than in control woodlots (5.1%). *Cotesia melanoscela* parasitized a greater proportion of larvae occurring in the upper canopy of trees. Despite significantly higher rates of parasitism in release woodlots, inundative releases of the Korean strain of *C. melanoscela* failed to reduce gypsy moth populations as determined from egg mass counts. Environmental entomology. Apr 1988. v. 17 (2). p. 403-408. Includes references. (NAL Call No.: DNAL QL461.E532).



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1489

**Evaluation and application of the TAMBEETLE and Arkansas southern pine beetle spot growth models in the Gulf Coastal Plain.**

Nettleton, W.A. Connor, M.D.; Ryan, G.W. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 202-205. Includes references. (NAL Call No.: DNAL aSD11.U57).

1490

**Evaluation of a hemlock sawfly outbreak in the northern tip of Idaho-1985.**

Tunnock, S. Missoula, Mont. : The Region. Report - USDA Forest Service, Forest Pest Management, Northern Region. Nov 1985. (85-26). 4 p. maps. Includes references. (NAL Call No.: DNAL aSD11.U585).

1491

**Evaluation of a repellent for prevention of attacks by three species of southern pine bark beetles (Coleoptera: Scolytidae).**

JESCEP. Berisford, C.S. Brady, U.E.; Fatzinger, C.W.; Ebel, B.H. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Oct 1986. v. 21 (4). p. 316-318. Includes references. (NAL Call No.: DNAL QL461.G4).

1492

**Evaluation of an insect collecting system and an ultra-low-volume spray system on a remotely piloted vehicle.**

JEENAI. Tedders, W.L. Gottwald, T.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. June 1986. v. 79 (3). p. 709-713. ill. Includes references. (NAL Call No.: DNAL 421 J822).

1493

**An evaluation of avian impact assessment techniques following broad-scale forest insecticide sprays.**

ETOCDK. Mineau, P. Peakall, D.B. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1987. v. 6 (10). p. 781-791. Includes references. (NAL Call No.: DNAL QH545.A1E58).

1494

**Evaluation of diflubenzuron as a control agent for hemlock looper (Lepidoptera: Geometridae).** JEENAI. Retnakaran, A. Raske, A.G.; West, R.J.; Lim, K.P.; Sundaram, A. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1698-1705. ill., maps. Includes references. (NAL Call No.: DNAL 421 J822).

1495

**Evaluation of Dipel foliage protection program in Midland County.**

MUCBA. Smitley, D.R. Mech, R.; Melchior, G.; Vandyke, L. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 42-45. (NAL Call No.: DNAL 275.29 M58B).

1496

**Evaluation of Douglas-fir mortality from Douglas-fir beetle from 1982 through 1984 following MCH application.**

McGregor, M.D. Oakes, R.D.; Meyer, H.E. Missoula, Mont. : The Region. Report - USDA Forest Service, Northern Region. Mar 1985. (85-7). 9 p. Includes references. (NAL Call No.: DNAL aSD11.U585).

1497

**Evaluation of hydraulically applied baculovirus preparations to control western spruce budworm (Lepidoptera: Tortricidae) on grand fir.**

JEENAI. Stelzer, M.J. Scott, D.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1105-1108. Includes references. (NAL Call No.: DNAL 421 J822).

1498

**Evaluation of insecticides for control of Glyphidocera juniperella (Lepidoptera: Blastobasidae) in container-grown juniper.**

FETMA. Mizell, R.F. III, Schiffhauer, D.E. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Sept 1987. v. 70 (3). p. 316-320. Includes references. (NAL Call No.: DNAL 420 F662).

1499

**Evaluation of larch casebearer parasites on the Flathead National Forest, Montana--1985.**

Tunnock, S. Bousfield, W. Missoula, Mont. : The Region. Report - USDA Forest Service, Forest Pest Management, Northern Region. Oct 1985. (85-24). 4 p. Includes references. (NAL Call No.: DNAL aSD11.U585).

1500

**An evaluation of methods for assessing impacts of pests on forest productivity.**

XFGTA. Froelich, R.C. Miller, T.; Belanger, R.P. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the "Conference on Forest Growth Modelling and Prediction," Aug 23-27, 1987, Minneapolis, Minnesota. 1988. (120). p. 458-466. Includes references. (NAL Call No.: DNAL aSD11.A352).

1501

**Evaluation of miticides for effective control of spruce spider mite.**

Regan, R. Corvallis, Or. : The Service. Ornamentals northwest - Cooperative Extension Service, Oregon State University. Sept/Oct 1988. v. 12 (5). p. 14-17. (NAL Call No.: DNAL SB403.07).

1502

**Evaluation of (S)-verbenone applications for suppressing southern pine beetle (Coleoptera: Scolytidae) infestations.**

JEENAI. Payne, T.L. Billings, R.F. Lanham, Md. : Entomological Society of America. Field tests were conducted to evaluate the efficacy of various applications of the beetle-produced, inhibitory compound (S)-verbenone for suppressing infestations of the southern pine beetle, *Dendroctonus frontalis* Zimmermann. Twenty-four expanding infestations (spots), ranging in size from 22 to 140 active trees, and representing a variety of stand conditions, were treated with one of five different applications. Treatments included: (A) (S)-verbenone applied at the rate of 4 ml per tree, (B) (S)-verbenone applied at 8 ml per tree, (C) (S)-verbenone at 8 ml per tree in combination with felling all freshly-attacked trees, and the preliminary treatments; (D) (S)-verbenone in combination with the attractant frontalin, and (E) (S)-verbenone plus frontalin, plus felling all infested trees. In all treatments, (S)-verbenone was mixed with a sustained release liquid polymer and applied to a horseshoe-shaped buffer of uninfested trees at the advancing head of the infestation. To draw emerging beetles away from the advancing head, in Treatments D and E, frontalin, a beetle-produced attractant, was applied in the center of the infestation to nonhost trees or to host trees previously

infested by beetles. To measure treatment efficacy, rates of spot growth following treatment were compared with pretreatment infestation growth rates. Observed rates of spot growth before and after treatment were compared with spot growth projections generated by a southern pine beetle spot growth prediction model. Results showed that Treatment C was the most effective and practical treatment tested. Spot growth in all five infestations treated with this application was completely halted with few or no additional trees being attacked. Treatment B proved relatively effective in slowing rates of spot growth in small or moderate-sized spots. Treatment E was effective in completely halting spot growth in two large infestations in sawtimber stands, but the treatment required the use of two behavioral. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1702-1708. Includes references. (NAL Call No.: DNAL 421 J822).

1503

**Evaluation of the dye marker Sudan Red 7B with *Reticulitermes flavipes* (Isoptera: Rhinotermitidae).**

SOCID. Grace, J.K. Abdallay, A. Chico, Calif. : California State University, Department of Biological Sciences. Sociobiology. 1989. v. 15 (1). p. 71-77. Includes references. (NAL Call No.: DNAL QH549.56).

1504

**Evaluation of the influence of droplet size and density of *Bacillus thuringiensis* against gypsy moth larvae (Lepidoptera: Lymantriidae).**

JEENAI. Bryant, J.E. Yendol, W.G. Lanham, Md. : Entomological Society of America. A study was conducted to determine the effect of spray droplet size and density on the efficacy of a commercial preparation of *Bacillus thuringiensis* against the gypsy moth (*Lymantria dispar* L.). A concentration of 5,795 International Units (IU)/microliter was used. In the laboratory, various size droplets and densities were tested against larvae using 12-cm<sup>2</sup> red oak leaflets. Results show that producing relatively high densities of small (50-150 micrometers) droplets of *B. thuringiensis* will increase the efficacy compared with larger droplets (greater than 150 micrometers) present at low densities at the same dose. Median lethal dose estimates are made for droplets in three size classes (50-150, 150-250, and 250-350 micrometers): LD95's for the generalized size classes of 100, 200, and 300 micrometers were 10.8, 2.2, and 0.9 drops/cm<sup>2</sup>, respectively. Implications of these results are discussed. Journal of economic entomology. Feb 1988. v. 81 (1). p. 130-134. Includes references. (NAL Call No.: DNAL 421 J822).



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1505

Evaluation of the overwintering success of two European microsporidia inoculatively released into gypsy moth populations in Maryland.

JIVPA. Jeffords, M.R. Maddox, J.V.; McManus, M.L.; Webb, R.E.; Wieber, A. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. Mar 1989. v. 53 (2). p. 235-240. Includes references. (NAL Call No.: DNAL 421 J826).

1506

Evaluation of thinning for reduction of losses from southern pine beetle attack in loblolly pine stands.

SJAFFD. Burkhart, H.E. Haney, H.L. Jr.; Newberry, J.D.; Leuschner, W.A.; Morris, C.L.; Reed, D.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1986. v. 10 (2). p. 105-108. Includes references. (NAL Call No.: DNAL SD1.S63).

1507

Evidence for multivoltinism in *Prodiptosis platani* Gagne (Diptera: Cecidomyiidae), a leaf curl midge of American sycamore.

PESWA. Neal, J.W. Jr. Gott, K.M. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. Apr 1988. v. 90 (2). p. 201-203. ill. Includes references. (NAL Call No.: DNAL 420 W27).

1508

Evidence of a polymorphic life cycle in the hemlock woolly adelgid, *Adelges tsugae* (Homoptera: Adelgidae).

AESAAI. McClure, M.S. Lanham, Md. : The Society. Annals of the Entomological Society of America. Jan 1989. v. 82 (1). p. 50-54. maps. Includes references. (NAL Call No.: DNAL 420 EN82).

1509

An experimental study of the effect of group size on larval growth and survivorship in the imported willow leaf beetle, *Plagioderia versicolora* (Coleoptera: Chrysomelidae).

EVETEX. Breden, F. Wade, M.J. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1082-1086. Includes references. (NAL Call No.: DNAL QL461.E532).

1510

Exploration for and importation of natural enemies of the gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), in North America: an update.

PESWA. Coulson, J.R. Fuester, R.W.; Schaefer, P.W.; Ertle, L.R.; Kelleher, J.S.; Rhoads, L.D. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. Literature review. July 1986. v. 88 (3). p. 461-475. Includes references. (NAL Call No.: DNAL 420 W27).

1511

Extraction of areas infested by pine bark beetle using Landsat MSS data.

PERSD. Mukai, Y. Sugimura, T.; Watanabe, H.; Wakamori, K. Falls Church, Va. : American Society of Photogrammetry and Remote Sensing. Photogrammetric engineering and remote sensing. Jan 1987. v. 53 (1). p. 77-81. ill., maps. Includes references. (NAL Call No.: DNAL 325.28 P56).

1512

Extractives of seeds of the Meliaceae: effects on *Spodoptera frugiperda* (J.E. Smith), *Acalymma vittatum* (F.), and *Artemia salina* Leach.

JCECD. Mikolajczak, K.L. Reed, D.K. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1987. v. 13 (1). p. 99-111. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1513

Factors contributing to southern pine beetle host resistance.

Hain, F.P. Cook, S.P.; Matson, P.A.; Wilson, K.G. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 154-160. Includes references. (NAL Call No.: DNAL aSD11.U57).

1514

Factors influencing suitability of elms for elm leaf beetle, *Xanthogaleruca luteola* (Coleoptera: Chrysomelidae).

EVETEX. Young, C.E. Hall, R.W. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1986. v. 15 (4). p. 843-849. Includes references. (NAL Call No.: DNAL QL461.E532).

1515

**A faunal survey of spiders associated with *Pinus radiata* in a southern California farm.**  
JARCD. Ali, A.D. Hartin, J.S. Lubbock, Tex. : American Arachnological Society. The journal of arachnology. Summer 1988. v. 16 (2). p. 269-272. Includes references. (NAL Call No.: DNAL QL451.J6).

1516

**Feeding preferences of eastern spruce budworm larvae in two-choice tests with extracts of mature foliage and with pure amino acids.**  
JCECD. Albert, P.J. Parisella, S. New York, N.Y. : Plenum Press. Journal of chemical ecology. Aug 1988. v. 14 (8). p. 1649-1656. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1517

**Fenitrothion and aminocarb residues in water and balsam fir foliage following spruce budworm spraying programs in Quebec, 1979 to 1982.**  
BECTA. Morin, R. Gaboury, G.; Mamarbachi, G. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Apr 1986. v. 36 (4). p. 622-628. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

1518

**Field and laboratory evaluations of *Bacillus thuringiensis* strains for control of elm leaf beetle.**  
JOARD. Cranshaw, W.S. Day, S.J.; Gritzmacher, T.J.; Zimmerman, R.J. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Feb 1989. v. 15 (2). p. 31-34. Includes references. (NAL Call No.: DNAL SB436.J6).

1519

**Field application of entomogenous nematodes for biological control of clear-wing moth borers in alder and sycamore trees.**  
JOARD. Kaya, H.K. Brown, L.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. June 1986. v. 12 (6). p. 150-154. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Field comparison of spruce budworm pheromone lures.**  
Grimble, D.G. Broomall, Pa. : The Station. Forest Service research note NE-RN-7. Northeastern Forest Experiment Station, Forest Service, U.S. Department of Agriculture. Dec 1987. (339). 4 p. Includes references. (NAL

Call No.: DNAL A99.9 F7622U).

1521

**Field efficacy of the NRD-12 strain of *Bacillus thuringiensis* against gypsy moth (Lepidoptera: Lymantriidae).**  
JEENAI. Dubois, N.R. Reardon, R.C.; Kolodny-Hirsch, D.M. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1672-1677. Includes references. (NAL Call No.: DNAL 421 J822).

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EVETEX. Sower, L.L. Mitchell, R.G. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1145-1147. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Influence of host genotype on Douglas-fir seed losses to *Contarinia oregonensis* (Diptera: Cecidomyiidae) and *Megastigmus spermotrophus* (Hymenoptera: Torymidae) in western Oregon.** EVETEX. Schowalter, T.D. Haverty, M.I. Lanham, Md. : Entomological Society of America. Seed losses to the Douglas-fir cone gall midge, *Contarinia oregonensis* Foote, and Douglas-fir seed chalcid, *Megastigmus spermotrophus* (Wachtl), were measured in a Douglas-fir, *Pseudotsuga menziesii* (Mirbel) Franco, clonal seed orchard and in a Douglas-fir progeny plantation in western Oregon. Seed losses to both insects differed significantly (P less

than 0.05) among clones and among the progeny of selected parental crosses. Seed loss differed more than three times between least-infested and most-infested clones or progeny. Seed losses in the progeny plantation indicated that resistance to these two insects is a heritable trait, with greater resistance showing a tendency to dominate over lesser resistance. Insect responses to host genotype may be modified by factors associated with the position of the tree within the stand. Implications of these results for tree improvement programs and seed orchard management are discussed. Environmental entomology. Feb 1989. v. 18. p. 94-97. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Influence of selected host plants on gypsy moth (Lepidoptera: Lymantriidae) larval mortality caused by a baculovirus.**

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EVETEX. Kolodny-Hirsch, D.M. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1988. v. 17 (1). p. 127-131. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Introduction and North American establishment of *Coccygomimus disparis* (Hymenoptera: Ichneumonidae), a polyphagous pupal parasite of Lepidoptera, including gypsy moth.**  
EVETEX. Schaefer, P.W. Fuester, R.W.; Chianese, R.J.; Rhoads, L.D.; Tichenor, R.B. Jr. Lanham, Md. : Entomological Society of America. Recoveries of *Coccygomimus disparis* (Viereck) from pupae of gypsy moth, *Lymantria dispar* (L.), in Pennsylvania, Maryland, New Jersey, Massachusetts, Virginia, Vermont, New York, Nebraska, and Ontario, Canada, indicate that this Palearctic species is now well established in North America. This represents the first successful establishment of a natural enemy of gypsy moth in North America in nearly 50 yr. Levels of pupal parasitism in gypsy moth average 1.9% (maximum 13%). Historical records indicate *C. disparis* was intentionally imported from India (1972), Japan (1976), and Korea (1984). Laboratory rearing resulted in the eventual release of more than 819,012 individuals liberated in 16 states. Details on the biology of this wasp, its foreign collection, introduction, release, and recovery (first in North America in 1978) are documented. Recovery from *Thyridopteryx ephemeraeformis* (Haworth) (Psychidae) and *Malacosoma americanum* (F.) (Lasiocampidae) in New Jersey and *Dioryctria auranticella* (Grote) (Pyralidae) from Nebraska, as well as host data from outside the United States, indicates that *C. disparis* is not specific to gypsy moth and should be searched for in other forest or shade tree Lepidoptera. Recent collections of *M. americanum* in New Jersey showed 20.6% parasitism. Overall effectiveness as a biological control agent against the gypsy moth or other hosts remains uncertain but promising. Environmental entomology. Dec 1989. v. 18 (6). p. 1117-1125. maps. Includes references. (NAL Call No.: DNAL QL461.E532).

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### **Inventory monitoring for estimating impact of insects on seed production in a Douglas-fir seed orchard in western Oregon.**

JEENAI. Dombrosky, S.A. Schowalter, T.D. Lanham, Md. : Entomological Society of America. Impact of various factors on seed production was examined in a Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) seed orchards in western Oregon during 1984. Cones were examined monthly between April and September for mortality or evidence of insect damage. Loss of immature cones began early in the growing

season and had a substantial impact on seed production. A newly discovered cone-feeding weevil, *Lepesoma lecontei* (Casey), caused a large proportion of this mortality. Unexplained cone mortality (possibly frost damage), undeveloped seed, Douglas-fir cone gall midge (*Contarinia oregonensis* Foote), and Douglas-fir seed chalcid (*Megastigmus spermatrophus* (Wachtl)) were other major causes of seed loss. Crown elevation was important for an accurate estimate of the importance of some seed-loss factors. An inventory monitoring system for Douglas-fir seed production based on early monitoring of immature cones, identifying specific seed loss factors, stratified crown sampling, and an adequate sample size, is suggested. *Journal of economic entomology*. Feb 1988. v. 81 (1). p. 281-285. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Inverse density-dependent parasitism of the bagworm, *Thyridopteryx ephemeraeformis* (Lepidoptera: Psychidae).**

EVETEX. Cronin, J.T. Lanham, Md. : Entomological Society of America. This paper reports the results of a controlled manipulative experiment with the bagworm, *Thyridopteryx ephemeraeformis* (Haworth), on eastern redcedar, *Juniperus virginiana* L., to determine whether parasitism is density-dependent. Parasitoid foraging behavior indicated that two spatial scales were appropriate: individual trees and small patches of trees. Percentage of parasitism by *Itoplectis conquisitor* (Say) declined significantly as the density of female bagworms on individual trees increased. Although mathematically possible, this inverse density-dependent response appears too "vague" to promote the stability of the bagworm-I. conquisitor system. Other factors that may be involved in the regulation or control of the bagworm are discussed. *Environmental entomology*. June 1989. v. 18 (3). p. 403-407. Includes references. (NAL Call No.: DNAL QL461.E532).

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AMFOA. Mettger, Z. Moll, G. Washington, D.C. : American Forestry Association. *American forests*. Jan/Feb 1989. v. 95 (1/2). p. 61-64. ill. (NAL Call No.: DNAL 99.8 F762).

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### **Isabella County: Summary of gypsy moth impacts management activities, and plans.**

MUCBA. Thompson, L. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 20-21.



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**Isolation and characterization of *Entomophaga maimaiga* sp. nov., a fungal pathogen of gypsy moth, *Lymantria dispar*, from Japan.**

JIVPA. Soper, R.S. Shimazu, M.; Humber, R.A.; Ramos, M.E.; Hajek, A.E. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. May 1988. v. 51 (3). p. 229-241. ill. Includes references. (NAL Call No.: DNAL 421 J826).

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**ITEMS: an integrated method to project southern pine stand development.**

Vasievich, J.M. Thompson, W.A. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 300-327. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Jack pine budworm surveys.**

Dixon, J.C. Broomall, Pa. : The Service. Evaluation report S - U.S. Department of Agriculture Forest Service, Northeastern Area, State & Private Forestry. Dec 1985. (9). 18 p. Includes references. (NAL Call No.: DNAL aSB763.A115E8).

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**Japanese beetle (Coleoptera: Scarabaeidae): feeding by adults on minor host and nonhost plants.**

JEENAI. Ladd, T.L. Jr. Lanham, Md. : Entomological Society of America. Foliage samples from 48 minor host and nonhost plants (33 families) of the Japanese beetle, *Popillia japonica* Newman, were evaluated in the laboratory to determine their influence on the feeding response of the insect under controlled conditions. Only foliage from strawberry, *Fragaria X ananassa* Duchesne, induced greater feeding than that brought about by feeding on sassafras, *Sassafras albidum* (Nutt.) Nees, a favored host used as a comparison standard. Foliage from three other plants, silver linden, *Tilia tomentosa* Moench, black tupelo, *Nyssa sylvatica* Marsh., and pignut hickory, *Carya glabra* (Mill.) Sweet, induced feeding comparable with that of sassafras. Two plants considered to be nonhosts, red maple, *Acer rubrum* L., and mock orange, *Philadelphus coronarius* L., induced measurable feeding by the insect. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1616-1619. Includes references. (NAL Call No.: DNAL 421 J822).

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**Japanese beetle (Coleoptera: Scarabaeidae) traps: evaluation of single and multiple arrangements for reducing defoliation in urban landscape.**

JEENAI. Gordon, F.C. Potter, D.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1986. v. 79 (5). p. 1381-1384. Includes references. (NAL Call No.: DNAL 421 J822).

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**Knowledge system environment for integrated pest management in forest landscapes: the southern pine beetle (Coleoptera: Scolytidae).**

Coulson, R.N. Saunders, M.C.; Loh, D.K.; Oliveria, F.L.; Drummond, D.; Barry, P.J.; Swain, K.M. Lanham, Md. : The Society. Bulletin of the Entomological Society of America. Summer 1989. v. 35 (2). p. 26-32. Includes references. (NAL Call No.: DNAL 423.9 EN8).

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**Laboratory assessment of predation by *Lonchaea corticis* (Diptera: Lonchaeidae) on *Pissodes strobi* (Coleoptera: Curculionidae).**

EVETEX. Hulme, M.A. Lanham, Md. : Entomological Society of America. Larvae of *Lonchaea corticis* Taylor killed and consumed pupae and to a lesser extent prepupal larvae of *Pissodes strobi* (Peck) at temperatures ranging from 5 to 14 degrees C during a 3-wk experiment in glass vials that were monitored weekly. Marginal predation of pupae but not prepupal larvae was observed at 0 degrees C. In simulated pupal cells of *P. strobi* stored outdoors in a Victoria, British Columbia, winter, *L. corticis* larvae killed and consumed pupae and prepupal larvae of *P. strobi* in a 3-wk experiment that left most cells devoid of obvious prey remains. Tests in glass vials in March with *L. corticis* larvae collected during March and during the previous August showed that *L. corticis* larvae remain predacious at the end of winter. When the insects were left in situ in severed leaders stored outdoors in a Victoria, British Columbia, winter, the proportion of pupal cells with live *P. strobi* decreased significantly and the proportion of pupal cells emptied without insect emergence increased significantly; the numbers of *L. corticis* larvae and total *P. strobi* pupal cells did not change significantly. These experiments show that *P. strobi* pupae and prepupal larvae can be vulnerable prey for *L. corticis* larvae and that

predation may be common in the winter conditions of coastal British Columbia. Environmental entomology. Dec 1989. v. 18 (6). p. 1011-1014. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Overwintering of Phryganidia californica in the Oregon Cascades and notes on its parasitoids (Lepidoptera: Dioptriidae).**  
PPETA9. Carmean, D. Miller, J.C.; Scaccia, B. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. Jan 1989. v. 65 (1). p. 74-76. Includes references. (NAL Call No.: DNAL 421 P193).

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Oviposition preference and host recognition by the black vine weevil, *Otiorhynchus sulcatus* (Coleoptera: Curculionidae).

EVETEX. Hanula, J.L. College Park, Md. : Entomological Society of America. The black vine weevil, *Otiorhynchus sulcatus* (F.), preferred to oviposit in containers with Japanese yew, *Taxus cuspidata* Siebold and Zuccarini, cv. Densa, foliage over 10 other plant species when given alternating 5- or 7-d exposures. Host experience of larvae or prereproductive adults generally had no effect on their overall preference for *Taxus*. Weevils did not differentiate between pairs of most nonhosts but exhibited some preference for strawberry, *Fragaria ananassa* Duchesne. Females had to contact *Taxus* foliage to be stimulated to oviposit. Antennectomized weevils were able to differentiate between *Taxus* and *Ilex crenata* compacta Thunberg foliage, but they laid a greater proportion of their eggs on *Ilex* than intact weevils. It is suggested that *T. cuspidata* and possibly strawberry foliage contain an oviposition stimulant for the black vine weevil which is perceived only by contact or feeding. Environmental entomology. Aug 1988. v. 17 (4). p. 694-698. Includes references. (NAL Call No.: DNAL QL461.E532).

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Parasitoids reared from *Ancylis platanana* (Clemens) (Lepidoptera: Tortricidae), a defoliator of sycamore trees.

JKESA. Thompson, L.C. Solomon, J.D. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Oct 1986. v. 59 (4). p. 745-749. Includes references. (NAL Call No.: DNAL 420 K13).

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Partial inhibition of pheromone production in *Dendroctonus ponderosae* (Coleoptera: Scolytidae) by polysubstrate monooxygenase inhibitors.

JCECD. Hunt, D.W.A. Smirle, M.J. New York, N.Y. : Plenum Press. Journal of chemical ecology. Feb 1988. v. 14 (2). p. 529-536. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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Pathways of nucleopolyhedrosis virus infection in the gypsy moth, *Lymantria dispar*.

XGNEA. Shields, K.S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 123-124. Includes references. (NAL Call No.: DNAL aSD11.U56).

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### **Periodical cicada in Indiana.**

Schuder, D.L. Lafayette : The Service. Publication E - Purdue University, Cooperative Extension Service. Subseries: Ornamentals insects. Apr 1985. (47,rev.). 2 p. ill. Includes references. (NAL Call No.: DNAL SB844.I6P8).

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**Persistence of *Bacillus thuringiensis* in two formulations applied by helicopter against the western spruce budworm (Lepidoptera: Tortricidae) in north central Oregon.** JEENAI. Beckwith, R.C. Stelzer, M.J. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1987. v. 80 (1). p. 204-207. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Pests not known to occur in the United States or of limited distribution. 65.**

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Whittle, K. Anderson, D.M. Hyattsville, Md. The Service. APHIS 81 - U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Sept 1987. (50). 12 p. ill., maps. Includes references. (NAL Call No.: DNAL aSB599.A3U5).

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**Phenology and degree-day relationships of the obscure scale (Homoptera: Diaspididae) and associated parasites on pin oak in Kentucky.** JEENAI. Potter, D.A. Jensen, M.P.; Gordon, F.C. Lanham, Md. : Entomological Society of America. Seasonal phenology of the obscure scale, *Melanaspis obscura* (Comstock), was monitored for 4 yr on *Quercus palustris* M. in Lexington, Ky., and emergence of adult males and crawlers was related to physiological time (i.e., degree-days DD). This scale is univoltine in Kentucky and both sexes overwinter as second instars. Date of first hatch of crawlers during 1984-1986 ranged from 22 June to 6 July, corresponding to a mean accumulation of 1,521 DDC (2,737 DDF) calculated from a base of 4.44

degrees C (40 degrees F). This value accurately predicted crawler hatch dates in West Lafayette, Ind., and College Park, Md., in 1986, and in Lexington in 1987. Six species of primary parasites and one hyperparasite species were reared from scale-infested twig samples. Parasite flight periods were determined from sticky trap collections within tree crowns. Application of insecticidal sprays during July for control of obscure scale crawlers would unfortunately coincide with peak activity of the scale's primary parasites. *Journal of economic entomology*. Apr 1989. v. 82 (2). p. 551-555. Includes references. (NAL Call No.: DNAL 421 J822).

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**Phenology and heat accumulation as field guides for the seasonal history of the western pine shoot borer (Lepidoptera: Olethreutidae).**

JEENAI. Mitchell, R.G. Sower, L.L. Lanham, Md. : Entomological Society of America. Survey and control measures are available for the western pine shoot borer, *Eucosma sonomana* Kearfott, but timing is a problem because of the cryptic nature of the insect in the field. In central Oregon, key features of the insect's seasonal history were related to heat accumulation (degree-days DD above 5.5 degrees C) and phenological characteristics of one of its hosts, ponderosa pine, *Pinus ponderosa* Douglas ex Laws., and eight other associated shrubs and forbs. These relationships permit the status of the shoot borer's seasonal history, such as the egg-laying period, to be established indirectly from local temperature records or by observations of some obvious phenological characteristics of its host and associated plants. *Journal of economic entomology*. Feb 1988. v. 81 (1). p. 286-289. Includes references. (NAL Call No.: DNAL 421 J822).

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**Pheromone-dependent species recognition mechanisms between *Neodiprion pinetum* and *Diprion similis* on white pine.**

JCECD. Olaf, J.I. Matsumura, F.; Kikukawa, T.; Coppel, H.C. New York, N.Y. : Plenum Press. *Journal of chemical ecology*. Apr 1988. v. 14 (4). p. 1131-1144. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1839

**Pheromone lures to monitor sparse populations of spruce budworm, *Choristoneura fumiferana* (Lepidoptera: Tortricidae).**

GRLEA. Grimbale, D.G. East Lansing, Mich. : Michigan Entomological Society. *The Great Lakes entomologist*. Winter 1988. v. 21 (4). p. 141-145. Includes references. (NAL Call No.: DNAL QL461.M5).

1840

**Pheromone mating disruption of *Rhyacionia zozana* (Lepidoptera: Tortricidae): influence on the associated parasite complex.**

EVETEX. Niwa, C.G. Daterman, G.E. Lanham, Md. : Entomological Society of America. Larval and pupal parasites were collected before and after a mating disruption test of *Rhyacionia zozana* (Kearfott) to determine if the pheromone treatment affected either the species distribution or abundance of the parasite complex. Total percentage of parasitism was not changed because of the disruption treatment. In treated areas, however, abundance of the most numerous moth parasite, *Glypta zozanae* Walley and Barron, was reduced significantly below check plantation levels. In contrast, abundance of the pupal parasite *Mastrus aciculatus* (Provancher) was higher in pheromone-disrupted areas. No changes in the sex ratios of these species were attributable to the pheromone treatment. Parasite community structures were compared using a similarity index. The degree of likeness between treated and checked plantations decreased after disruption, probably because of the changes in the incidence of parasitism by *G. zozanae* and *M. aciculatus*. Accounting for parasitism and reduced mating, surviving host populations in check plantations were over four times greater than in pheromone-disrupted areas. The importance of the host's sex pheromone as a potential kairomone and effects of changes in the host density caused by the mating disruption treatment on the associated parasite complex are discussed. *Environmental entomology*. Aug 1989. v. 18 (4). p. 570-574. Includes references. (NAL Call No.: DNAL QL461.E532).

1841

**Pilot test of red oak borer silvicultural control in commercial forest stands.**

Feicht, D.L. Acciavatti, R. Urbana-Champaign : Dept. of Forestry, University of Illinois. 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey D. Dawson and Kimberly A. Majerus. p. 280-284. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

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**The pine-bark beetle ecosystem: a pest management challenge.**

Waters, W.E. New York : Wiley, c1985. Integrated pest management in pine-bark beetle ecosystems / edited by William E. Waters, Ronald W. Stark, David L. Wood. p. 1-48. maps. (NAL Call No.: DNAL SB608.P65I58).



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### **Pine needle midge.**

MUCBA. Wilson, L.F. Sapio, F.J.; Simmons, G.A. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. May 1987. (2061). 2 p. ill. (NAL Call No.: DNAL 275.29 M58B).

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### **Pitch-blister moth on loblolly pine.**

AKFRAC. Thompson, L.C. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. Sept/Oct 1987. v. 36 (5). p. 10. ill. (NAL Call No.: DNAL 100 AR42F).

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JEENAI. Pajares, J.A. Lanier, G.N. Lanham, Md. : Entomological Society of America. Commercial formulations of four pyrethroid insecticides, fluvalinate (Mavrik), permethrin (Pounce), cypermethrin (Ammo), and esfenvalerate (Asana), were 222-548 times more toxic to European elm bark beetles, Scolytus multistriatus (Marsham), than was methoxychlor. Compared with methoxychlor, all of the pyrethroids provided superior protection from twig feeding; two products, cypermethrin and esfenvalerate, killed all beetles contacting sample twigs and prevented twig feeding through an 18-wk period of bioassays after spray. The same two compounds applied to infested elm wood killed all beetles before, or shortly after, they emerged; chlorpyrifos also caused 100% mortality of beetles emerging from brood wood, but its action was not as rapid. The pyrethroids tested could increase the effectiveness of spraying elm crowns to prevent Dutch elm disease. They also could be used to eliminate elm bark beetles as they emerge from brood wood or land on treated surfaces baited with attractants. Potency and durability combined with their low risk to birds and mammals give the pyrethroids excellent

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AMNTA. Fowler, S.V. Lawton, J.H. Chicago, Ill. : University of Chicago Press. The American naturalist. Literature review. Aug 1985. v. 126 (2). p. 181-195. Includes references. (NAL Call No.: DNAL 470 AM36).

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### Rates of parasitism and sex ratios of Ablerus clisiocampae and Ooencyrtus clisiocampae egg parasites of the forest tent caterpillar, Malacosoma disstria in southern Louisiana.

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Cranshaw, W.S. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 28-30. Includes references. (NAL Call No.: DNAL aSD11.A42).

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XGNEA. Beck, W.R. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 141-142. (NAL Call No.: DNAL aSD11.U56).

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XGNEA. Dimond, J.B. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 47-53. Includes references. (NAL Call No.: DNAL aSD11.U56).

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### **Recent field studies on the use of *Bacillus thuringiensis* to control the gypsy moth (*Lymantria dispar* L.).**

XGNEA. Dubois, N.R. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 83-85. Includes references. (NAL Call No.: DNAL aSD11.U56).

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### **Record of decision, USDA Forest Service, suppression of the southern pine beetle final environmental impact statement /deciding official: F. Dale Robertson.**

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### **Recovery of *Eucosma sonomana* (Lepidoptera: Tortricidae) populations after mating-disruption treatments.**

JEENAI. Sower, L.L. Overhulser, D.L. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1986. v. 79 (6). p. 1645-1647. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Recovery of pine beauty moth (*Panolis flammea*) nuclear polyhedrosis virus from pine foliage.**

JIVPA. Carruthers, W.R. Cory, J.S.; Entwistle, P.F. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. July 1988. v. 52 (1). p. 27-32. Includes references. (NAL Call No.: DNAL 421 J826).

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JESCEP. Kudon, L.H. Berisford, C.W.; Dalusky, M.J. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Apr 1988. v. 23 (2). p. 180-186. Includes references. (NAL Call No.: DNAL QL461.G4).

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FDSCA. Witter, J.A. Ragenovich, I.R. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1986. v. 32 (3). p. 585-594. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Reinvestigation confirms action of delta 11-desaturases in spruce budworm moth sex pheromone biosynthesis.**  
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1896

**Relationship between color intensity of leaf supernatants from resistant and susceptible birch trees and rate of oviposition by the birch leafminer (Hymenoptera: Tenthredinidae).**  
JEENAI. Fiori, B.J. Graig, D.W. Lanham, Md. : Entomological Society of America. In no-choice laboratory tests, young leaves from trees of *Betula davurica* Pall. Fl. Ross., *Betula maximowicziana* Reg., *Betula schmidtii* Reg., and *Betula costata* Trautv. exhibited 95-100% reductions in oviposition by the birch leafminer *Fenusa pusilla* (Lepelletier) compared with leaves from *Betula populifolia* Marsh. Visible absorbance ratios (500 nm: 400 nm) of aqueous supernatants from leaves which exhibited high reductions in oviposition were 2.5- to 4-fold greater than ratios from leaves of *B. populifolia*. Results suggest these trees offer high resistance against birch leafminer damage and that absorbance characteristics of supernatants from young leaves can be used to detect high levels of resistance. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1331-1333. Includes references. (NAL Call No.: DNAL 421 J822).

1897

**Relationship between outbreaks of saddled prominent, *Heterocampa guttivitta* (Lepidoptera: Notodontidae), and drought.**  
EVETEX. Martinat, P.J. Allen, D.C. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1987. v. 16 (1). p. 246-249. Includes references. (NAL Call No.: DNAL QL461.E532).

1898

**Relationship between susceptibility of gypsy moth larvae (Lepidoptera: Lymantriidae) to a Baculovirus and host plant foliage constituents.**  
EVETEX. Keating, S.T. Yendol, W.G.; Schultz, J.C. Lanham, Md. : Entomological Society of America. The susceptibility of gypsy moth, *Lymantria dispar* L., larvae to the gypsy moth nuclear polyhedrosis virus was significantly altered when larvae were fed different host plants in conjunction with the virus. Larvae consuming the virus on the foliage of oak species suffered lower mortality rates than did larvae consuming the virus-contaminated foliage of aspen species. Decreased viral pathogenicity was correlated with increased acidity and hydrolyzable tannin content of the leaf material. Environmental entomology. Dec 1988. v. 17 (6). p. 952-958. Includes references. (NAL Call No.: DNAL QL461.E532).

1899

**The relationship between western spruce budworm defoliation levels and growth of individual Douglas-fir and grand fir trees.**  
FDSCA. Nichols, T.J. Bethesda, Md. : Society of American Foresters. Abstract: Regression models were fit relating foliage levels to height and basal area growth of 192 trees from 26 stands representing a wide range of site and stand conditions. The study confirmed that deteriorated tree conditions in prior years (often resulting from defoliation) affect current-year growth at specific foliage levels. Absolute height and basal area growth at specific foliage levels were found to be linearly related to absolute height and basal area growth before defoliation, indicating that proportional growth losses resulting from specified levels of defoliation do not vary between fast-growing and slow-growing trees. Various site, stand, and tree variables showed no effect on the relationship between foliage levels and proportional growth loss. Models that included predicted nondefoliated growth, foliage level, and preceding-year condition variables explained up to 61 and 91% of the variation in height and basal area growth (In-In transformation), respectively. FOR. SCI. 34(2):496-504. Forest science. June 1988. v. 34 (2). p. 496-504. Includes references. (NAL Call No.: DNAL 99.8 F7632).

1900

**Relationship of symbiotic fungi to southern pine beetle population trends.**  
Bridges, J.R. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 127-135. Includes references. (NAL Call No.: DNAL aSD11.U57).



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1901

### **Relative effect of seed and cone insects on ponderosa pine in northern Arizona.**

JEENAI. Blake, E.A. Wagner, M.R.; Koerber, T.W. Lanham, Md. : Entomological Society of America. A total of 2,548 second-year cones were collected from 10 ponderosa pine, *Pinus ponderosa* Dougl. ex Laws., trees at each of five representative stands in northern Arizona in fall 1984. Five insect species were responsible for cone mortality and seed destruction. *Dioryctria auranticella* Grote (Lepidoptera: Pyralidae) caused the most mortality, killing all of the cones on some individual trees. On a plot average basis, this species was responsible for 38.7-81.0% of the cone mortality. Less (but still substantial) cone mortality was caused by *Conophthorus ponderosae* Hopkins (Coleoptera: Scolytidae) and *Conotrachelus neomexicana* Fall (Coleoptera: Curculionidae). *Cydia piperana* (Kearfott) (Lepidoptera: Olethreutidae) destroyed 1.3-7.6 seeds per cone in the cones that survived. Radiographic examination of apparently normal seeds from surviving cones showed that 46.0-70.0% were destroyed by *Megastigmus albifrons* Walker (Hymenoptera: Torymidae). In combination, these five insect species dramatically reduced the production of ponderosa pine seeds at the locations studied. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1691-1694. Includes references. (NAL Call No.: DNAL 421 J822).

1902

### **Remedial treatment of lodgepole pine infested with mountain pine beetle: efficacy of three insecticides.**

Tilden, P.E. Berkeley, Calif. : The Station. USDA Forest Service research note PSW - Pacific Southwest Forest and Range Experiment Station. May 1985. (374). 4 p. Includes references. (NAL Call No.: DNAL A99.9 F7652).

1903

### **Reproductive enhancement by adult feeding: effects of honeydew in imbibed water on spruce budworm.**

JLPSA. Miller, W.E. Los Angeles, Calif. : The Society. Journal of the Lepidopterists' Society. 1989. v. 43 (3). p. 167-177. Includes references. (NAL Call No.: DNAL 421 L554).

1904

### **Research and education: introduction.**

MUCBA. Montgomery, B.A. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 31. (NAL Call No.: DNAL 275.29 M58B).

1905

### **Residual toxicity of a high-potency formulation of *Bacillus thuringiensis* to spruce budworm (Lepidoptera: Tortricidae).**

JEENAI. Van Frankenhuyzen, K. Nystrom, C. Lanham, Md. : Entomological Society of America. Foliar persistence of an aqueous high-potency formulation of *Bacillus thuringiensis* (Thuricide 48LV) applied to a white spruce (*Picea glauca* Moench.) plantation at 2.4 liter/ha was assessed. Residual toxicity of treated foliage to spruce budworm, *Choristoneura fumiferana* (Clemens), larvae was less than 2 d despite high spray deposition on the target foliage. Experiments with potted balsam fir indicated that wash-off by rain was the primary cause for loss of residual toxicity, whereas inactivation by sunlight played a limited role. As little as 6 mm of rain caused a substantial loss of residual toxicity. We conclude that deposits of Thuricide 48LV (low viscosity) on white spruce and balsam fir (*Abies balsamea* L.) foliage are highly susceptible to wash-off by rain. A high concentration of active ingredient does not improve foliar persistence and a suitable sticker is required. Journal of economic entomology. June 1989. v. 82 (3). p. 868-872. Includes references. (NAL Call No.: DNAL 421 J822).

1906

### **Residues of lindane and chlorpyrifos in firewood and woodsmoke.**

JESCEP. Bush, P.B. Taylor, J.W.; McMahon, C.K.; Neary, D.G. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Apr 1987. v. 22 (2). p. 131-139. Includes references. (NAL Call No.: DNAL QL461.G4).

1907

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PAWPAG. Tamashiro, M. Yamamoto, R.; Ebesu, R. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1988. v. 84. p. 246-253. ill. Includes references. (NAL Call No.: DNAL 300.9 AM3).

1908

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Lunderstadt, J. New York : Springer-Verlag. c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 131-137. ill. Includes references. (NAL Call No.: DNAL SB761.M46).

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XFIPA. Hoff, R.J. Ogden, Utah : The Station. USDA Forest Service research paper INT - Intermountain Research Station. Feb 1988. (387). 3 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764U).

1910

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JIVPA. Butt, T.M. Humber, R.A. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. Jan 1989. v. 53 (1). p. 121-123. ill. (NAL Call No.: DNAL 421 J826).

1911

**Response of mountain pine beetle, *Dendroctonus ponderosae* Hopkins, and pine engraver, *Ips pini* (Say), to ipsdienol in southwestern British Columbia.**  
JCECD. Hunt, D.W.A. Borden, J.H. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1988. v. 14 (1). p. 277-293. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1912

**Response of *Plagithymys bilineatus* Sharp (Coleoptera: Cerambycidae) to healthy and stressed ohia trees.**  
PPETA9. Stein, J.D. Nagata, R.F. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. Oct 1986. v. 62 (4). p. 344-349. Includes references. (NAL Call No.: DNAL 421 P193).

1913

**Response of smaller European elm bark beetles to pruning wounds on American elm.**  
JOARD. Barger, J.H. Cannon, W.N. Jr. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1987. v. 13 (4). p. 102-104. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

1914

**Response of spruce budworm (Lepidoptera: Tortricidae) infected with *Nosema fumiferanae* (Microsporida) to *Bacillus thuringiensis* treatments.**  
EVETEX. Bauer, L.S. Nordin, G.L. Lanham, Md. : Entomological Society of America. Disease in spruce budworm, *Choristoneura fumiferana* (Clemens), caused by the microsporidian *Nosema fumiferanae* (Thomson), increased larval susceptibility to mortality by *Bacillus*

*thuringiensis* (Berliner) treatments compared with larvae free of *N. fumiferanae* disease. The median lethal concentration (LC50) of *B. thuringiensis*, as determined by the diet incorporation bioassay method, was significantly lower for larvae infected transovarially with *N. fumiferanae*, but the similar slope obtained for initially healthy larvae indicated an independent and additive interaction. The median lethal time (LT50) for *B. thuringiensis* was shortest for the group diseased with *N. fumiferanae*. Results from separate and sequential oral treatments (horizontal transmission) of both microorganisms at fixed physiological stages support the findings from the transovarial studies. It also was determined that *N. fumiferanae*-free larvae surviving *B. thuringiensis* treatments were more susceptible to mortality from subsequent inoculations with *N. fumiferanae* than were larvae not previously exposed to *B. thuringiensis*. Environmental entomology. Oct 1989. v. 18 (5). p. 816-821. Includes references. (NAL Call No.: DNAL QL461.E532).

1915

**Response of the southern pine bark beetle guild (Coleoptera: Scolytidae) to host disturbance.**  
EVETEX. Coulson, R.N. Flamm, R.O.; Pulley, P.E.; Payne, T.L.; Rykiel, E.J.; Wagner, T.L. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1986. v. 15 (4). p. 850-858. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

1916

**Response of *Zeiraphera canadensis* (Lepidoptera: Tortricidae: Olethreutinae) to candidate sex attractants and factors affecting trap catches.**  
EVETEX. Turgeon, J.J. Grant, G.G. College Park, Md. : Entomological Society of America. Environmental entomology. June 1988. v. 17 (3). p. 442-447. Includes references. (NAL Call No.: DNAL QL461.E532).

1917

**Review of foliage protection spray operations against the spruce budworm with *Bacillus thuringiensis kurstakii* from 1980 to 1983 in Nova Scotia and New Brunswick, Canada.**  
XGNEA. Kettela, E.G. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 19-22. Includes references. (NAL Call No.: DNAL aSD11.U56).



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PPETA9. Halstead, J.A. Niwa, C.G. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. July 1987. v. 63 (3). p. 276-277. Includes references. (NAL Call No.: DNAL 421 P193).

1919

**Risk assessment of investments in loblolly pine plantations threatened by bark beetles.**  
Anderson, W.C. Guldin, R.W.; Vasievich, J.M. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 328-334. Includes references. (NAL Call No.: DNAL aSD11.U57).

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XGNEA. Olson, C.E. Jr. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 165-169. Includes references. (NAL Call No.: DNAL aSD11.U56).

1921

**Role of insects and diseases in a jack pine provenance study.**  
GRLEA. Hodson, A.C. French, D.W.; Jensen, R.A. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Winter 1986. v. 19 (4). p. 239-247. Includes references. (NAL Call No.: DNAL QL461.M5).

1922

**The role of resin acids in the relationship between Scots pine and the sawfly, Diprion pini (Hymenoptera: Diprionidae). II. Correlations with the biology of Diprion pini.**  
Geri, C. Buratti, L.; Allais, J.P. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 189-201. Includes references. (NAL Call No.: DNAL SB761.M46).

1923

**The role of resin acids in the relationship between Scots pine and the sawfly, Diprion pini (Hymenoptera: Diprionidae). I. Resin acids in the needles.**  
Buratti, L. Allais, J.P.; Barbier, M. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 171-187. Includes references. (NAL Call No.: DNAL SB761.M46).

1924

**Role of tree improvement in providing pest-resistant eastern white pine (Pinus strobus L.).**  
GTRWD. Garrett, P.W. Washington, D.C. : The Service. General technical report WO - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 75-88. ill. Includes references. (NAL Call No.: DNAL aSD11.U52).

1925

**Root weevils: some adults overwintered, others are still emerging.**  
Green, J.L. Capizzi, J. Corvallis : The Service. Ornamentals northwest newsletter - Cooperative Extension Service, Oregon State University. Spring 1985. v. 9 (1). p. 12-14. Includes references. (NAL Call No.: DNAL SB403.07).

1926

**Roscommon County pilot gypsy moth project.**  
MUCBA. Mech, R. Sapio, F.; Mahalak, B. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 28-29. maps. (NAL Call No.: DNAL 275.29 M58B).

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Rush, P.A. Allen, D.C. Washington, D.C. : The Service. Forest insect & disease leaflet - U.S. Department of Agriculture Forest Service. Sept 1987. (167). 8 p. ill. Includes references. (NAL Call No.: DNAL A423.9 F764).

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**Saginaw County: summary of gypsy moth impacts, management activities, and plans.**

MUCBA. Thews, J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 26-27. maps. (NAL Call No.: DNAL 275.29 M58B).

1929

**SAS or IPM which direction for your company?.**

Van Nuys, Calif. : Gold Trade Publications. Arbor age. Feb 1989. v. 9 (2). p. 12-14. ill. (NAL Call No.: DNAL SB435.5.A645).

1930

**Seasonable reminders: plant galls.**

Larew, H. Alexandria, Va. : The American Horticultural Society. American horticulturist. Dec 1985. v. 64 (12). p. 10-11, 34. ill. (NAL Call No.: DNAL 80 N216).

1931

**Seasonal variations in energy sources and biosynthesis of terpenes in maritime pine.**

Bernard-Dagan, C. New York : Springer-Verlag. c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 93-116. ill., maps. Includes references. (NAL Call No.: DNAL SB761.M46).

1932

**The second annual report of the Gypsy Moth Technical Committee: gypsy moth in Michigan, 1987.**

MUCBA. Montgomery, B.A. (ed.). East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. May 1988. (2142). 73 p. ill., maps. Includes references. (NAL Call No.: DNAL 275.29 M58B).

1933

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AGREA. Brown, A. Washington, D.C. : The Administration. Agricultural research - U.S. Department of Agriculture, Agricultural Research Service. May 1987. v. 35 (5). p. 13-15. ill. (NAL Call No.: DNAL 1.98 AG84).

1934

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CAGRA. Stein, U. Parrella, M.P. Berkeley : The Station. California agriculture - California Agricultural Experiment Station. July/Aug 1985. v. 39 (7/8). p. 19-20. ill. (NAL Call No.: DNAL 100 C12CAG).

1935

**Selected effects of sublethal dosages of three insecticides on the bagworm.**

JOARD. Rudd, B. Ashdown, D.; Sanders, D.P. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. July 1985. v. 11 (7). p. 207-209. Includes references. (NAL Call No.: DNAL SB436.U6).

1936

**Selection of active strains of the gypsy moth nuclear polyhedrosis virus.**

XGNEA. Shapiro, M. Dougherty, E. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 115-122. ill. Includes references. (NAL Call No.: DNAL aSD11.U56).

1937

**Selection of new more potent strains of Bacillus thuringiensis for use against gypsy moth and spruce budworm.**

XGNEA. Dubois, N.R. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 99-102. Includes references. (NAL Call No.: DNAL aSD11.U56).

1938

**Sequence of trees attacked by spruce beetles in a mature even-aged spruce stand in south-central Alaska.**

NOSCA. Hard, J.S. Pullman, Wash. : Washington State University Press. Northwest science : official publication of the Northwest Scientific Association. Feb 1989. v. 63 (1). p. 5-12. Includes references. (NAL Call No.: DNAL 470 N81).



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1939

### **Sex pheromone of *Planotortrix* species found on mangrove.**

JCECD. Foster, S.P. Clearwater, J.R.; Roelofs, W.L. New York, N.Y. : Plenum Press. Journal of chemical ecology. Mar 1987. v. 13 (3). p. 631-637. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1940

### **Sex pheromone of purplestriped shootworm, *Zeiraphera unfortunana* Powell.**

JCECD. Silk, P.J. Butterworth, E.W.; Kuenen, L.P.S.; Northcott, C.J.; Kettela, E.G. New York, N.Y. : Plenum Press. Journal of chemical ecology. May 1988. v. 14 (5). p. 1417-1425. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1941

### **Sex-specific production of ipsdienol and myrcenol by *Dendroctonus ponderosae* (Coleoptera: Scolytidae) exposed to myrcene vapors.**

JCECD. Hunt, D.W.A. Borden, J.H.; Pierce, H.D. Jr.; Slessor, K.N.; King, G.G.S.; Czyzewska, E.K. New York, N.Y. : Plenum Press. Journal of chemical ecology. July 1986. v. 12 (7). p. 1579-1586. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1942

### **Silverspotted tiger moths on conifers.**

Capizzi, J. Corvallis : The Service. Ornamentals northwest newsletter - Cooperative Extension Service, Oregon State University. Spring 1985. v. 9 (1). p. 11-12. ill. (NAL Call No.: DNAL SB403.07).

1943

### **Silvicultural practices for lodgepole pine stands in commercial forests.**

XGTIA. Cole, D.M. McGregor, M.D. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Apr 1985. (174). p. 47-56. ill. (NAL Call No.: DNAL aSD11.A48).

1944

### **Silviculture--a remedy for southern pine beetle problems.**

Belanger, R.P. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. Meeting held Oct 16-19, 1988, Rochester, New York. 1989. p. 187-191. Includes references. (NAL Call No.: DNAL SD143.S64).

1945

### **Silviculture vs. the gypsy moth: can it help?.**

Twery, M.J. Gottschalk, K.W. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. Meeting held Oct 16-19, 1988, Rochester, New York. 1989. p. 169-172. Includes references. (NAL Call No.: DNAL SD143.S64).

1946

### **Simulation of southern pine beetle-associated timber loss using CLEMBEETLE.**

Hedden, R.L. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 288-291. Includes references. (NAL Call No.: DNAL aSD11.U57).

1947

### **Single and double application of fenvalerate and dimethoate for control of Douglas-fir seed and cone insects.**

JEENAI. Stein, J.D. Tilden, P.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1987. v. 80 (5). p. 1076-1078. Includes references. (NAL Call No.: DNAL 421 J822).

1948

### **Single and multiple applications of fenvalerate to protect western white pine cones from *Dioryctria abietivorella* (Lepidoptera: pyralidae).**

JEENAI. Haverty, M.I. Shea, P.J.; Stipe, L.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1986. v. 79 (1). p. 158-161. Includes references. (NAL Call No.: DNAL 421 J822).

1949

### **Site influences on *Hylobius* congener (Coleoptera: Curculionidae), a seedling debarking weevil of conifer plantations in Maine.**

EVETEX. Welty, C. Houseweart, M.W. College Park, Md. : Entomological Society of America. Environmental entomology. Dec 1985. v. 14 (6). p. 826-833. Includes references. (NAL Call No.: DNAL QL461.E532).

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1950

**Site/stand factors influencing Nantucket pine tip moth in loblolly pine plantations.**

Kulhavy, D.L. Ross, W.G.; Meeker, J.R.; Tracey, W.D. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 563-566. Includes references. (NAL Call No.: DNAL aSD11.U57).

1951

**Sites of production and occurrence of volatiles in Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopkins.**

JCECD. Madden, J.L. Pierce, H.D. Jr.; Borden, J.H.; Butterfield, A. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1988. v. 14 (4). p. 1305-1317. Includes references. (NAL Call No.: DNAL QD415.A1J6).

1952

**Soil and water quality.**

XGTIA. McGregor, M.D. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Apr 1985. (174). p. 44. (NAL Call No.: DNAL aSD11.A48).

1953

**Some arthropods for natural control of aphids on hickories and walnuts.**

Bissell, T.L. Baltimore, Md. : Maryland Entomological Society. Maryland entomologist. 1987. p. 10-13. ill. Includes references. (NAL Call No.: DNAL QL461.M37).

1954

**Some insect pests of conifer seedlings in British Columbia.**

Shrimpton, G. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 128-130. Includes references. (NAL Call No.: DNAL aSD11.A42).

1955

**Some negative aspects of using *Bacillus thuringiensis* Berliner in operational programs against the gypsy moth (*Lepidoptera:Lymantriidae*).**

XGNEA. Kegg, J.D. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 33-34. (NAL Call No.: DNAL aSD11.U56).

1956

**Southern pine bark beetles in the urban environment.**

JOARD. Cameron, R.S. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. June 1987. v. 13 (6). p. 145-151. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

1957

**The southern pine beetle.**

Flamm, R.O. Coulson, R.N.; Payne, T.L. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 531-553. ill., maps. Includes references. (NAL Call No.: DNAL SB761.D96).

1958

**The southern pine beetle decision support system.**

Sauders, M.C. Loh, D.K.; Rykiel, E.J.; Coulson, R.N.; Payne, T.L.; Pulley, P.E.; Sharpe, P.J.H.; Hu, L. Florence, Ala. : The Institute, c1985. Software solutions : proceedings: symposium, software fair and 2nd Annual Meeting of Forest Resources System Institute, April 21-24, 1985, Clarksville, Indiana / edited by J.G. Massey, B.J. Greber, T.M. p. 92-103. ill. Includes references. (NAL Call No.: DNAL SD381.5.S62).

1959

**Southern pine beetle (*Dendroctonus frontalis*), 1970-1986.**

Longenecker, W.H. Beltsville, Md. : The Library. Quick bibliography series - National Agricultural Library (U.S.). Bibliography. Feb 1987. (87-13). 28 p. (NAL Call No.: DNAL aZ5071.N3).



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1960

### **Southern pine beetle IPM.**

AKFRAC. Stephen, F.M. Lih, M.P.; Wallis, G.W. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. Nov/Dec 1988. v. 37 (6). p. 5. (NAL Call No.: DNAL 100 AR42F).

1961

### **Southern pine beetle prevention and control measures for nonindustrial private landowners in South Carolina.**

XFGSA. Remion, M.C. Boone, A.J. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 45-49. ill. Includes references. (NAL Call No.: DNAL aSD433.A53).

1962

### **Southern pine beetle technology transfer in Texas.**

XFGSA. Billings, R.F. Bryant, C.M.; Pase, V.H.A. III; Wilson, K.A.; Walker, C. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 55-63. ill., maps. Includes references. (NAL Call No.: DNAL aSD433.A53).

1963

### **SPB-MICROBEETLES: a simulation system for evaluating economic performance of management alternatives for stands attacked by Southern Pine beetles.**

Thompson, W.A. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 292-299. Includes references. (NAL Call No.: DNAL aSD11.U57).

1964

### **SPBEEP--A computer program.**

Atlanta : The Service. Forestry bulletin R8-FB/P - United States Department of Agriculture, Forest Service, Southeastern Area, State and Private Forestry. May 1985. (17). 1 p. (NAL Call No.: DNAL aSD11.U594).

1965

### **Spectral characteristics of tree components of balsam fir and spruce damaged by spruce budworm.**

FOSCA. Leckie, D.G. Ostaff, D.P.; Teillet, P.M.; Fedosjevs, G. Bethesda, Md. : Society of American Foresters. Spectral reflectances from 360 to 1100 nm at 5 nm intervals in 6 nm bands were measured with a laboratory spectrometer for samples of the components of balsam fir and white spruce trees defoliated by the spruce budworm. These components included current-year needles, 1-year-old needles, 2-year and older needles, budworm feeding debris, twigs, bark, and lichen. Current-year needles had significantly higher reflectances than older needles in the green and yellow parts of the spectrum. Feeding debris, which is visually red, had a smooth spectral curve of increasing reflectance with wavelength. The greatest difference between needles and feeding debris was in the short near-infrared wavelengths and at the chlorophyll absorption maximum near 670 nm. The reflectance of twigs and bark changed with age and exposure to weathering. Variability in their reflectance was large. There were no distinct narrow band features of twig or feeding debris reflectance, which would be characteristic of defoliation. Lichen is highly reflective, and its presence on branches of defoliated trees will greatly alter branch reflectance characteristics. Changes in spectral reflectance of trees throughout the various stages of a spruce budworm outbreak depend on a complex interrelationship of the reflectances of individual components which, in turn, are complex and changing. Forest science. June 1989. v. 35 (2). p. 582-600. Includes references. (NAL Call No.: DNAL 99.8 F7632).

1966

### **Spiders (Araneae) associated with strip-clearcut and dense spruce-fir forests of Maine.**

JARCD. Jennings, D.T. Houseweart, M.W.; Dondale, C.D.; Redner, J.H. Lubbock, Tex. : American Arachnological Society. The journal of arachnology. Spring 1988. v. 16 (1). p. 55-70. ill. Includes references. (NAL Call No.: DNAL QL451.J6).

1967

### **Spray swath patterns of small aircraft and vertical distribution of microbial spray deposits.**

XGNEA. Yendol, W.G. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 151-153. ill. (NAL Call No.: DNAL aSD11.U56).

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1968

### **Spruce aphid.**

WUEXA. Davidson, R. Jr. Antonelli, A.L. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Insect Answers. Dec 1988. (1053,rev.). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

1969

### **Spruce budworm damage in aspen/balsam fir stands affected by cutting methods.**

Batzer, H.O. Benzie, J.W.; Popp, M.P. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. June 1987. v. 4 (2). p. 73-75. ill. Includes references. (NAL Call No.: DNAL SD143.N6).

1970

### **Spruce budworm/deer winter range: a situation statement.**

XGNEA. Alexander, C.E. Garland, L.E. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 211-216. Includes references. (NAL Call No.: DNAL aSD11.U56).

1971

### **Spruce budworm growth impact study 1982 report.**

MAMRA. Brann, T.B. Reams, G.A.; Solomon, D.S. Orono, Me. : The Station. Miscellaneous report - University of Maine Agricultural Experiment Station. Includes statistical data. Dec 1985. (302). 53 p. maps. Includes references. (NAL Call No.: DNAL 100 M28M).

1972

### **The spruce budworm in eastern North America.**

Mattson, W.J. Simmons, G.A.; Witter, J.A. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 309-330. ill. Includes references. (NAL Call No.: DNAL SB761.D96).

1973

### **Spruce budworm in Minnesota: loss assessment, current conditions and management options.**

XGNEA. Carroll, M.R. Albers, M.A.; Campbell, J. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm",

April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 55-58. Includes references. (NAL Call No.: DNAL aSD11.U56).

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*Heterorhabditis heliothidis* (Khan, Brooks &  
Hirschmann), and *Heterorhabditis* sp. ('Holland'  
strain) were compared with two insecticides  
(chlorpyrifos and isofenphos) for control of  
third- (last-) instar larval Japanese beetles  
(*Popillia japonica* Newman) and European chafers  
*Rhizotrogus majalis* (Razoumowsky) in potted  
Japanese yew (*Taxus cuspidata* Siebold &  
Zuccarini). Efficacy was evaluated 17-21 d  
after treatment. *Heterorhabditis* sp. ('Holland'  
strain) at 92 nematodes per cm<sup>2</sup> of soil surface  
and *H. heliothidis* at 192 nematodes per cm<sup>2</sup>  
provided greater than 90% control of Japanese  
beetles compared with 71% for chlorpyrifos (9.0  
kg AI /ha) and 84% for isofenphos (4.5 kg  
AI /ha). *S. glaseri* provided 84 and *S. feltiae*  
29% control (both at 385 nematodes per cm<sup>2</sup>).  
Both nematodes and insecticides were less

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effective in controlling European chafer larvae. Control with nematodes ranged from 46 to 59% with *S. glaseri*, *H. heliothidis*, and *Heterorhabditis* sp. at 385 nematodes per cm<sup>2</sup>, whereas *S. feltia* at 385 nematodes per cm<sup>2</sup> did not significantly reduce larval survival compared with the untreated control. Chemical control of European chafer larvae resulted in reductions of 44 and 62% with isofenphos and chlorpyrifos, respectively. *Journal of economic entomology*. Feb 1988. v. 81 (1). p. 152-157. Includes references. (NAL Call No.: DNAL 421 J822).

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EVETEX. Nyrop, J.P. Simmons, G.A. College Park, Md. : Entomological Society of America. *Environmental entomology*. June 1986. v. 15 (3). p. 481-487. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

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WUEXA. Antonelli, A. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Jan 1989. (0787,rev.). 8 p. ill. (NAL Call No.: DNAL 275.29 W27P).

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**Timing of trunk-implanted acephate for protection of Douglas-fir from defoliation by the western spruce budworm.**

Koerber, T.W. Sandquist, R.E. Bethesda, Md. : Society of American Foresters. *Western journal of applied forestry*. Oct 1988. v. 3 (4). p. 126-128. Includes references. (NAL Call No.: DNAL SD388.W6).

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**Toxicity of host monoterpenes to *Dendroctonus frontalis* and *Ips calligraphus* (Coleoptera: Scolytidae).**

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XFGTA. Fosbroke, D.E. Hicks, R.R. Jr. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 74-80. maps. Includes references. (NAL Call No.: DNAL aSD11.A352).

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**A tree-ring reconstruction of western spruce budworm history in the southern Rocky Mountains.**

FOSCA. Swetham, T.W. Lynch, A.M. Bethesda, Md. : Society of American Foresters. Tree-ring width chronologies from ten mixed-conifer stands in the Colorado Front Range and New Mexico Sangre de Cristo Mountains were used to reconstruct the timing, duration, and radial growth impacts of past outbreaks of western spruce budworm *Choristoneura occidentalis* Freeman). At least nine outbreaks were identified in the stands from 1700 to 1983. Severity and timing of outbreaks was highly variable. The average duration of reduced growth periods caused by budworms was 12.9 years and ranged from 5 to 26 years. The average interval between initial years of successive outbreaks was 34.9 years and ranged from 14 to 58 years. The average maximum and periodic radial growth reductions were 50% and 21.7%, respectively. There was a relatively long period of reduced budworm activity in the first few decades of the twentieth century, and since that time outbreaks have been markedly more synchronous among the sampled stands. It is hypothesized that the increased synchronicity of outbreaks in the latter half of the twentieth century is due to changes in age structure and species composition following harvesting and fire suppression in the late nineteenth and early twentieth centuries. Forest science. Dec 1989. v. 35 (4). p. 962-986. maps. Includes references. (NAL Call No.: DNAL 99.8 F7632).



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**Trunk-implanted acephate to protect Douglas-fir seed crops on individual trees in northern California.**

JEENAI. Stein, J.D. Koerber, T.W.; Frank, C.L. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1668-1671. Includes references. (NAL Call No.: DNAL 421 J822).

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**Trunk implants protect prime firs.**

Pearce, R.B. Fort Collins, Colo. : The Service. Forestry research west - U.S. Department of Agriculture, Forest Service. June 1988. p. 18-22. ill. (NAL Call No.: DNAL aSD11.F6).

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**Trunk injection gave poor control of phylloxera.**

PEQUA. Calcote, V.R. Bryan, Tex. : Texas Pecan Growers Association. Pecan south including pecan quarterly. May/Apr 1989. v. 23 (2). p. 4, 6, 9. ill. Includes references. (NAL Call No.: DNAL SB401.A1P4).

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JOARD. Dreistadt, S.H. Dahlsten, D.L. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1988. v. 14 (9). p. 209-214. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Turning the tide of spruce budworm infestation.**

Reynolds, F. Fort Collins, Colo. : The Service. Forestry research west - U.S. Department of Agriculture, Forest Service. Oct 1989. p. 5-8. ill. Includes references. (NAL Call No.: DNAL aSD11.F6).

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**Turpentine-baited traps capture black turpentine beetles and other forest Coleoptera but do not prevent attacks on pines.**

Fatzinger, C.W. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 26-31. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**The U.S. Forest Service and aerial delivery systems.**

Reardon, R.C. Bethesda, MD : Agricultural Research Institute, 1988? . Improving on-target placement of pesticides : a conference : June 13-15, 1988, Sheraton International Conference Center, Reston, VA / sponsored by the Agric Res Inst in cooperation with the U.S.D.A., Science and Education. p. 151-155. (NAL Call No.: DNAL SB950.93.I5).

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**Ultrasonic acoustical emissions from sapwood of eastern white pine, northern red oak, red maple, and paper birch: implications for bark- and wood-feeding insects.**

FETMA. Haack, R.A. Blank, R.W.; Fink, F.T.; Mattson, W.J. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1988. v. 71 (4). p. 427-440. Includes references. (NAL Call No.: DNAL 420 F662).

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**Ultrastructural and autoradiographic investigations of the interference of chlorfluazuron with cuticle differentiation in the spruce budworm, Choristoneura fumiferana.** PCBPB. Retnakaran, A. MacDonald, A.; Nicholson, D.; Percy-Cunningham, J. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. Oct 1989. v. 35 (2). p. 172-184. ill. Includes references. (NAL Call No.: DNAL SB951.P49).

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**Ultrastructural study of the microsporidian Chytridiopsis typographi (Chytridiopsida:Microspora) infecting the bark beetle, Ips typographus (Scolytidae: Coleoptera), with new data on spore dimorphism.**

JIVPA. Purrini, K. Weiser, J. New York, N.Y. : Academic Press. Journal of invertebrate pathology. Jan 1985. v. 45 (1). p. 66-74. ill. Includes references. (NAL Call No.: DNAL 421 J826).

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**Ultrastructure of virus-like particles in hyphae of Entomophaga aulicae (Zygomycetes).** MYCOAE. Murrin, F. Newcomb, W.; Heath, I.B. Bronx, N.Y. : The New York Botanical Garden. Mycologia. July/Aug 1987. v. 79 (4). p. 644-649. ill. Includes references. (NAL Call No.: DNAL 450 M99).

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**Upwind flight orientation to pheromone in western pine beetle tested with rotating windvane traps.**

JCECD. Byers, J.A. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1988. v. 14 (1). p. 189-198. ill. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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**An urban forest integrated pest management program for gypsy moth: an example.**

JOARD. Ticehurst, M. Finley, S. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. July 1988. v. 14 (7). p. 172-175. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Urban pest management: decision-making and social conflict in the control of gypsy moth in west-coast cities.**

Czerwinski, C. Isman, M.B. College Park, Md. : The Society. Bulletin of the Entomological Society of America. Spring 1986. v. 32 (1). p. 36-41. Includes references. (NAL Call No.: DNAL 423.9 EN8).

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**USDA Forest Service Cooperative Gypsy Moth Suppression Projects -1985. --.**

Broomall, Pa. : Forest Pest Management, Northeastern Area State and Private Forestry, USDA Forest Service, 1985? . Cover title.~ At head of title: Environmental assessment. v, 24, 152 p. : maps ; 28 cm. (NAL Call No.: DNAL aSB945.G9U8).

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**Use of biological control measures in the intensive management of insect pests in New Jersey.**

Lashomb, J.H. Metterhouse, W.; Chianese, R. Greenbelt, Md. : Institute for Alternative Agriculture. The U.S. public is expressing strong preference for the use of biological control methods in the management of U.S. agricultural, forest and rangeland insect pests. This follows from a widespread understanding among citizens that synthetic insecticides have potentially harmful side effects on humans and that they are spreading increasingly as pollutants in the environment. Major recent increases in the number of pesticide-resistant insect species also put pressure on the agricultural community toward adoption of alternative non-agrochemical plant and animal protection strategies. Movement in the direction of such alternatives has been facilitated by the fact that in the last two decades much progress has been made in

Integrated Pest Management (IPM) through an improved understanding of the interactions of pests with their hosts. In that time period, many advances have been made in describing and predicting insect movement, seasonal cycles, and the effects of secondary plant compounds on insect reproduction. Simultaneously, much has been learned about the behavior, physiology, and population dynamics of insect parasitoids, i.e. parasites on insect pests. In the 1990's and subsequently, Biological Control Intensive Pest Management (BCIPM) will require continuing research to attain needed advancement in knowledge of growth and development of host plants, population dynamics of pests and parasitoids, and ecology of secondary pests that may interfere with implementation of BCIPM programs. Extension and research personnel will then be increasingly able to devise useful control methods for pests within selected cropping systems. We describe here examples to illustrate present and potential future use of BCIPM in different practical plant systems in New Jersey. American journal of alternative agriculture. Paper presented at the "Symposium on Biological Pest Control", Mar 1, 1988, Washington, DC.~ Literature review. Spring/Summer 1988. v. 3 (2/3). p. 77-82. Includes references. (NAL Call No.: DNAL S605.5.A43).

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**Use of foliar-applied neem (Azadirachta indica A. Juss.) seed extract for the control of the birch leafminer, Fenusa pusilla (Lepelletier) (Hymenoptera:Tenthredinidae).**

Larew, H.G. Knodel, J.J.; Marion, D.F. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1987. v. 5 (1). p. 17-19. Includes references. (NAL Call No.: DNAL SB1.J66).

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**Use of inventory-monitoring system for shortleaf and eastern white pine cone and seed crops at the Beech Creek Seed Orchard.**

TPLNA. Huffman, G.R. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1988. v. 39 (4). p. 23-29. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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Bousfield, W. Eder, R.; Bennett, D. Missoula, Mont. : The Region. Report - USDA Forest Service, Forest Pest Management, Northern Region. June 1985. (85-19). 19 p. Includes references. (NAL Call No.: DNAL aSD11.U585).



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Using indicator plants to assess susceptibility of California red fir and white fir to the fir engraver beetle.

Ferrell, G.T. Berkeley, Calif. : The Station. USDA Forest Service research note PSW - United States Pacific Southwest Forest and Range Experiment Station. Nov 1986. (388). 5 p. Includes references. (NAL Call No.: DNAL A99.9 F7652).

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Using stand culture techniques against defoliating insects.

XGTIA. Carlson, C.E. Lotan, J.E. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 275-277. Includes references. (NAL Call No.: DNAL aSD11.A48).

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Utilization of Australian pine (*Casuarina glauca*) as a larval foodplant by *Oncideres pustulatus* (Coleoptera: Cerambycidae) in deep southern Texas.

COBLA. Neck, R.W. Chicago, Ill. : Coleopterists Society. The Coleopterists' bulletin. Mar 1988. v. 42 (1). p. 84-86. Includes references. (NAL Call No.: DNAL 421 C674).

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Utilization of pheromones in forest pest management.

Berisford, C.W. DeBarr, G.L.; Payne, T.L. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. Literature review. 1985. (34th). p. 92-96. Includes references. (NAL Call No.: DNAL 99.9 L935).

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Variation in the chemistry of loblolly pine in relation to infection by the Blue-stain fungus.

Gambliel, H.A. Cates, R.G.; Caffey-Moquin, M.K.; Paine, T.D. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 177-184. Includes references. (NAL Call No.: DNAL aSD11.U57).

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Variation in the terpene chemistry of Douglas-fir and its relationship to western spruce budworm success.

Cates, R.G. Redak, R.A. San Diego : Academic Press, 1988. Chemical mediation of coevolution / edited by Kevin C. Spencer. Literature review. p. 317-344. Includes references. (NAL Call No.: DNAL QH372.C44).

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Variation of some secondary metabolites in juvenile stages of three plant species from tropical rain forest.

JCECD. Amo, R.S. del. Ramirez, J.G.; Espejo, O. New York, N.Y. : Plenum Press. Journal of chemical ecology. Oct 1986. v. 12 (10). p. 2021-2038. ill. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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Variations in nutrient levels as a defense: identifying key nutritional traits of host plants of the western spruce budworm.

Clancy, K.M. Wagner, M.R.; Tinus, R.W. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 203-213. Includes references. (NAL Call No.: DNAL SB761.M46).

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Vermont spruce budworm demonstration project background.

XGNEA. Hudson, S.T. Jr. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 211. (NAL Call No.: DNAL aSD11.U56).

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Vulnerability of hybrid *Populus* nursery stock to injury by the tarnished plant bug, *Lygus lineolaris* (Hemiptera: Miridae).

GRLEA. Wilson, L.F. Moore, L.M. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Spring 1985. v. 18 (1). p. 19-23. ill. Includes references. (NAL Call No.: DNAL QL461.M5).

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**A wasp parasite helps control the spruce gall midge.**

FOPSA. Stephens, G.R. New Haven, Conn. : The Station. Frontiers of plant science - Connecticut Agricultural Experiment Station. Fall 1985. v. 38 (1). p. 7-8. (NAL Call No.: DNAL 100 F92).

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**Water potential of fraser fir infested with balsam woolly adelgid (Homoptera: Adelgidae).**

EVETEX. Arthur, F.H. Hain, F.P. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1986. v. 15 (4). p. 911-913. Includes references. (NAL Call No.: DNAL QL461.E532).

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**The weevil *Barypeithes pellucidus* (Coleoptera: Curculionidae) feeds on northern red oak, *Quercus rubra*, seedlings.**

ETMNA6. Galford, J.R. Philadelphia, Pa. : American Entomological Society. Entomological news. May/June 1986. v. 97 (3). p. 113-114. Includes references. (NAL Call No.: DNAL 421 EN88).

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**Western pine shoot borer (Lepidoptera: Olethreutidae) response to site preparation in ponderosa pine plantations.**

JEENAI. Ross, D.W. Lanham, Md. : Entomological Society of America. The effects of six site preparation treatments on western pine shoot borer, *Eucosma sonomana* Kearfott, infestations were compared during the fifth through the eighth growing seasons after planting at three sites in southcentral Oregon. Treatments included a logged-only control, ripping, disking, brush-blading, herbicide spraying, and herbicide spraying followed by disking. Treatments that produced the greatest reduction in competing vegetation resulted in the best pine growth but also in the highest levels of *E. sonomana* infestation. Trees that were attacked by *E. sonomana* were significantly taller at the beginning of the growing season than trees that remained uninfested. The effect of *E. sonomana* infestation on height growth of ponderosa pines, *Pinus ponderosa* Douglas ex Laws., showed a significant interaction with total height of the pine trees at the beginning of the growing season; infested trees grew proportionally less than uninfested trees as total height increased. The results of this study illustrate the importance of incorporating pest management considerations into overall forest management plans. Journal of economic entomology. Apr 1989. v. 82 (2). p. 543-547. Includes references. (NAL Call No.: DNAL 421 J822).

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Alfaro, R.I. Wegwitz, E. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Apr 1988. v. 3 (2). p. 44-46. Includes references. (NAL Call No.: DNAL SD388.W6).

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Portland, Or. : The Region. Forest Service news - United States, Forest Service, Pacific Northwest Region. Mar 12, 1985. (V-8). 1 p. (NAL Call No.: DNAL aSD1.U5).

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**Western spruce budworm outbreaks in northern New Mexico: tree-ring evidence of occurrence and radial growth impacts from 1700 to 1983.**

Swetnam, T.W. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 130-141. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**When and where gypsy moth will cause defoliation in Michigan.**

MUCBA. Simmons, G.A. Gage, S.H.; Wirth, T.M. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 10-11. maps. (NAL Call No.: DNAL 275.29 M58B).



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**White grub (Coleoptera: Scarabaeidae) densities, weed control practices, and root damage to Fraser fir Christmas trees in the southern Appalachians.**  
JEENAI. Kard, B.M.R. Hain, F.P. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1987. v. 80 (5). p. 1072-1075. ill. Includes references. (NAL Call No.: DNAL 421 J822).

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**Within-tree effects of bark beetle insect associates on the emergence of *Ips calligraphus* (Coleoptera: Scolytidae).**  
EVETEX. Miller, M.C. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1986. v. 15 (5). p. 1104-1108. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Within-tree population parameters of *Dendroctonus frontalis* (Coleoptera: Scolytidae) in nylon mesh-enclosed *Pinus echinata*.**  
EVETEX. Cook, S.P. Hain, F.P. Lanham, Md. : Entomological Society of America. Within-tree populations of the southern pine beetle, *Dendroctonus frontalis* Zimmermann were examined in shortleaf pines, *Pinus echinata* (Mill.), with nylon mesh tents enclosing the portion of the bole where beetles were released. The distribution of the beetle population within the trees differed slightly from the distribution of beetles in naturally infested trees. However, the density, within-stage survival, and adult replacement rate were similar to measurements of these parameters in naturally infested trees. Also, the relationship between egg niche density and total parent gallery length was examined and found to be similar to previous reports. The tents protected the beetles from competing species; survivorship from egg to adult (33.5%) was high. It was concluded that the tents offer a reliable approach to examining the interactions between *D. frontalis* and its host pines. Possible uses of the tents for further studies on population dynamics and interspecific interactions are discussed. Environmental entomology. Dec 1989. v. 18 (6). p. 1025-1031. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

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Robinson, W.H. Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. In the series analytic: 1988-89 Insect pest management for recreation and household areas / coordinated by J.M. Luna. Jan 1988. (456-010, rev.). p. 3. (NAL Call No.: DNAL S544.3.V8V52).

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MUCBA. Dunn, G.A. Kennedy, M.K. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. June 1985. (1850). 2 p. (NAL Call No.: DNAL 275.29 M58B).

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**Wound compartmentalization potential and borer damage in green ash.**  
JOARD. Santamour, F.S. Jr. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. May 1987. v. 13 (5). p. 131-134. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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***Xanthoteras* sp. (Hymenoptera: Cynipidae) gall abundance on shinnery oak (*Quercus havardii*) in New Mexico: an indicator of plant stress?.**  
SWNAA. Dodson, G. Austin : Southwestern Association of Naturalists. The Southwestern naturalist. Dec 9, 1987. v. 32 (4). p. 463-468. ill., maps. Includes references. (NAL Call No.: DNAL 409.6 S08).

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**XRD-473 (an experimental benzoylphenylurea): rates and optimal time of application to western spruce budworm.**  
JESCEP. Robertson, J.L. Preisler, H.K. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Jan 1986. v. 21 (1). p. 16-20. ill. Includes references. (NAL Call No.: DNAL QL461.G4).

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**XRD-473 (an experimental benzoylphenylurea): rates and optimal time of application to western spruce budworm.**  
GENSAB. Robertson, J.L. Preisler, H.K. Tifton, Ga. : The Society. Journal of Entomological Science. Jan 1986. v. 21 (1). p. 16-20. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Xylem feeding by periodical cicada nymphs on pine and grass roots, with novel suggestions for pest control in conifer plantations and orchards.**  
OJSCA. Lloyd, M. White, J. Columbus, Ohio : Ohio Academy of Science. Ohio journal of science. June 1987. v. 87 (3). p. 50-54. ill., maps. Includes references. (NAL Call No.: DNAL 410 OH3).

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**Z-11-hexadecenyl acetate, a sex pheromone component for the southern pine coneworm, *Diorystria amatella* (Lepidoptera: Pyralidae).**  
EVETEX. Meyer, W.L. DeBarr, G.L.; Hanula, J.L.; Kovalev, B.; Cameron, R.S.; Berisford, C.W.; Roelofs, W.L. College Park, Md. : Entomological Society of America. Environmental entomology. Apr 1986. v. 15 (2). p. 316-320. Includes references. (NAL Call No.: DNAL QL461.E532).

2080

**1984 saw budworm population fall, but 13-year infestation isn't over yet.**  
PUPAA. Larsen, N.J. San Francisco, Calif. : Miller Freeman. Pulp and paper. Jan 1985. v. 59 (1). p. 136-139. ill. Includes references. (NAL Call No.: DNAL 302.8 P11).

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**1987 commercial pecan--disease, insect and weed control guide.**  
Patterson, M.G. Everest, J.W.; Goff, W.D. Auburn, Ala. : The Service. Circular ANR - Cooperative Extension Service, Auburn University. Dec 1986. (27). 15 p. (NAL Call No.: DNAL S544.3.A2C47).

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MUCBA. Priest, R.J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 4. (NAL Call No.: DNAL 275.29 M58B).



# PESTS OF PLANTS - NEMATODES

2083

**Basamid and solar heating effective for control of plant-parasitic nematodes at Bessey Nursery, Nebraska.**

Hildebrand, D.M. Dinkel, G.B. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 139-144. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Cambium destruction in conifers caused by pinewood nematodes.**

JONEB. Myers, R.F. Raleigh, N.C. : Society of Nematologists. Journal of nematology. July 1986. v. 18 (3). p. 398-402. ill. Includes 13 references. (NAL Call No.: DNAL QL391.N4J62).

2085

**Carbohydrate concentration in pine as affected by inoculation with *Bursaphelenchus xylophilus*.**

JONEB. Bolla, R.I. Fitzsimmons, K.; Winter, R.E.K. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Jan 1987. v. 19 (1). p. 51-57. Includes references. (NAL Call No.: DNAL QL391.N4J62).

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**Combatting insect pests of pine trees.**

Schuder, D.L. West Lafayette : The Service. Publication E - Purdue University, Cooperative Extension Service. In subseries: Ornamental Insects. Apr 1985. (32). 9 p. ill. (NAL Call No.: DNAL SB844.I6P8).

2087

**Dogwood canker.**

ANURA. Santamour, F.S. Jr. McArdle, A.J. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Feb 15, 1988. v. 167 (4). p. 73-81. ill. Includes references. (NAL Call No.: DNAL 80 AM371).

2088

**Effect of copper sulfate and lead acetate on infection of pines with *Bursaphelenchus xylophilus*.**

JONEB. Huber, M.C. Winter, R.E.K.; Bolla, R.I. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Jan 1989. v. 21 (1). p. 1-9. Includes references. (NAL Call No.: DNAL QL391.N4J62).

2089

**Effect of pinewood nematode density on tethered flight of *Monochamus carolinensis* (Coleoptera: Cerambycidae).**

EVETEX. Lanham, Md. : Entomological Society of America. *Monochamus carolinensis* (Olivier) beetles infested with the pinewood nematode, *Bursaphelenchus xylophilus*, were tethered and flown upon emergence from host logs. The mean (+/-SD) number of nematodes carried per beetle was, 7,933, (+/-16,997) with a mean flight time of 18.6 (+/-11.4) min. Larger beetles exhibited longer flights and carried more nematodes. The density of nematodes in the beetle had a slight negative influence on flight capability. The sex of the beetle had no effect on flight duration or the number of nematodes carried. Environmental entomology. Aug 1989. v. 18 (4). p. 670-673. Includes references. (NAL Call No.: DNAL QL461.E532).

2090

**Field evaluation of *Steinernema feltiae* against the web-spinning larch sawfly *Cephalcia lariciphila*.**

JONEB. Georgis, R. Hague, N.G.M. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Apr 1988. v. 20 (2). p. 317-320. Includes references. (NAL Call No.: DNAL QL391.N4J62).

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**Fungi associated with the pine wood nematode, *Bursaphelenchus xylophilus*, and cerambycid beetles in Wisconsin.**

MYCOAE. Wingfield, M.J. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Mar/Apr 1987. v. 79 (2). p. 325-328. Includes references. (NAL Call No.: DNAL 450 M99).

2092

**Heat-treating wood chips: a possible solution to pine wood nematode contamination.**

TAPPA. Kinn, D.N. Norcross, Ga. : The Technical Association of the Pulp and Paper Industry. Tappi journal. Jan 1986. v. 69 (1). p. 97-98. ill. Includes references. (NAL Call No.: DNAL 302.8 T162).

2093

**Impact of pinewood nematode in North America: present and future.**

JONEB. Bergdahl, D.R. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Apr 1988. v. 20 (2). p. 260-265. Includes references. (NAL Call No.: DNAL QL391.N4J62).

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2094

### **Insect pests of conifers.**

Scheibner, R.A. Potter, D.A. Lexington : The Service. ENT - University of Kentucky, College of Agriculture, Cooperative Extension Service. Dec 1986. (9,rev.). 13 p. (NAL Call No.: DNAL 275.29 K415E).

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before preservative treatment. During this  
period, the wood is susceptible to colonization

by decay fungi. Although these fungi have  
little effect on wood properties over the first  
2 years, their presence places added importance  
on adequate sterilization during treatment. The  
ability of ammonium bifluoride (ABF) to limit  
fungal colonization was evaluated by flooding  
pole sections with saturated solutions of ABF  
before air-seasoning them for 1, 2, or 3 years  
at sites in Oroville, Calif.; Eugene, Oreg.;  
Scappoose, Oreg.; and Arlington, Wash. Each  
year, selected poles were destructively sampled  
to determine levels of fungal colonization. The  
results indicate that ABF substantially reduced  
those levels, especially at the drier,  
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but not eliminate, the risk of fungal  
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Hansen, E.M. Goheen, D.J.; Hessburg, P.F.; Witcosky, J.J.; Schowalter, T.D. St. Paul, Minn. : APS Press, 1988. Leptographium root diseases on conifers / edited by T.C. Harrington and F.W. Cobb, Jr. p. 63-80. ill., maps. (NAL Call No.: DNAL SB608.C7L46).

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**Biomechanical pulping of aspen chips by Phanerochaete chrysosporium: fungal growth pattern and effects on wood cell walls.**

WOOF AU. Sachs, I.B. Leatham, G.F.; Myers, G.C. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1989. v. 21 (4). p. 331-342. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

2168

**Bound chlorinated residue in chloropicrin-treated Douglas-fir.**

WOOF AU. Goodell, B.S. Krahmer, R.L.; Graham, R.D. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1986. v. 18 (1). p. 127-133. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Burning cacodylic acid-treated oak trees: how safe?.**

FPJ OA. Woolson, E.A. Madison, Wis. : Forest Products Research Society. Forest products journal. May 1986. v. 36 (5). p. 49-52. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**The butternut--outlook grim.**

AMFOA. Anderson, R.L. Washington, D.C. : American Forestry Association. American forests. Sept/Oct 1988. v. 94 (9/10). p. 49. (NAL Call No.: DNAL 99.8 F762).

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**Cause and control of dogwood anthracnose in northeastern United States.**

JOARD. Daughtrey, M.L. Hibben, C.R.; Hudler, G.W. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. June 1988. v. 14 (6). p. 159-164. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Changes in structural and chemical components of wood delignified by fungi.**

WOSTBE. Blanchette, R.A. Otjen, L.; Effland, M.J.; Eslyn, W.E. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1985. v. 19 (1). p. 35-46. ill. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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**A chemical and microscopic study of decayed earlywood and latewood of loblolly pine killed by the southern pine beetle.**

WOOF AU. Shamoun, S.F. Levi, M.P. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1985. v. 17 (1). p. 22-28. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Chemistry of lignin biodegradation.**

Chen, C.L. Chang, H.M. Orlando, Fla. : Academic Press, c1985. Biosynthesis and biodegradation of wood components / edited by Takayoshi Higuchi. p. 535-556. Includes references. (NAL Call No.: DNAL TS932.B56).

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2175

### **Chestnut blight and its control.**

Griffin, G.U. Westport, Conn. : Avi.  
Horticultural reviews. Literature review. 1986.  
v. 8. p. 291-336. ill. Includes references.  
(NAL Call No.: DNAL SB317.5.H6).

2176

### **Chloromethane, a novel methyl donor for biosynthesis of esters and anisoles in *Phellinus pomaceus*.**

APMBA. Harper, D.B. Hamilton, J.T.G.; Kennedy, J.T.; McNally, K.J. Washington, D.C. : American Society for Microbiology. Chloromethane (CH<sub>3</sub>Cl), a gaseous natural product released as a secondary metabolite by many wood-rotting fungi of the family Hymenochaetaceae, has been shown to act as a methyl donor for biosynthesis of methyl esters of benzoic and furoic acid in the primary metabolism of *Phellinus pomaceus*. The broad-specificity methylating system could esterify a wide range of aromatic and aliphatic acids. In addition to CH<sub>3</sub>Cl, both bromo- and iodomethanes acted as methyl donors.

Methylation did not appear to proceed via methanol or a coenzyme A intermediate. The initial growth-related accumulation of methyl benzoate during culture of *P. pomaceus* was paralleled by an increase in activity of the methylating system in the mycelium. Changes in percent incorporation of C<sub>2</sub>H<sub>3</sub> from exogenous C<sub>2</sub>H<sub>3</sub>Cl during growth indicated that although utilization of CH<sub>3</sub>Cl was initially closely coupled to biosynthesis of the compound, the system became less channeled later in growth. This phase coincide with release of gaseous CH<sub>3</sub>Cl by the fungus. A biochemically distinct CH<sub>3</sub>Cl-utilizing system capable of methylating phenols and thiophenol was also identified in the fungus, but in contrast with the carboxylic acid-methylating systems, it attained maximum activity in the idiophase. Preliminary investigations of a non-CH<sub>3</sub>Cl-releasing fungus, *Fomitopsis pinicola*, have shown the presence of a CH<sub>3</sub>Cl-utilizing system capable of methylating benzoic acid suggesting that CH<sub>3</sub>Cl biosynthesis may occur in non-hymenochaetaceous fungi. Halogenated compounds hitherto found in nature are mainly stable end products of metabolism. The participation of CH<sub>3</sub>Cl in primary fungal metabolism demonstrates that some halometabolites may have a previously unrecognized role as intermediates in the biosynthesis of nonhalogenated natural products. Applied and environmental microbiology. Aug 1989. v. 55 (8). p. 1981-1989. Includes references. (NAL Call No.: DNAL 448.3 AP5).

2177

### **Colonization, emergence, and survival of *Hylurgopinus rufipes* and *Scolytus multistriatus* (Coleoptera: Scolytidae) in insecticide-treated elm wood.**

JEENAI. Phillipsen, W.J. Ascerno, M.E.; Landwehr, V.R. College Park, Md. : Entomological Society of America. Journal of

economic entomology. Oct 1986. v. 79 (5). p. 1347-1350. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Comandra blister rust.**

Johnson, D.W. Washington, D.C. : The Service. Forest insect & disease leaflet - U.S. Department of Agriculture Forest Service. June 1986. (62,rev.). 8 p. ill., maps. Includes references. (NAL Call No.: DNAL A423.9 F764).

2179

### **Companion planting of black walnut with autumn olive to control *Mycosphaerella* leaf spot of walnut.**

Kessler, K.J. Jr. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 285-288. ill. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

2180

### **Comparison of three soil fumigants in a barefoot conifer nursery.**

TPLNA. Campbell, S.J. Kelpsas, B.R. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1988. v. 39 (4). p. 16-22. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

2181

### **Comparison of wood preservatives in stake tests (1985 progress report).**

XALNA. Gjovik, L.R. Gutzmer, D.I. Madison : The Laboratory. USDA Forest Service research note FPL - United States, Forest Products Laboratory. Includes statistical data. May 1986. (O254). 100 p. (NAL Call No.: DNAL A99.9 F7634UN).

2182

### **Comparisons of pentachlorophenol formulations in soil-block tests.**

WOODFAJ. DeGroot, R.C. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Apr 1988. v. 20 (2). p. 209-214. Includes references. (NAL Call No.: DNAL TA419.W6).



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2183

**A conducive day concept to explain the effect of low temperature on the development of scleroderris shoot blight.**

PHYTA. Marosy, M. Patton, R.F.; Upper, C.D. St. Paul, Minn. : American Phytopathological Society. The in vitro growth of *Gremmeniella abietina* at -6 C both in the presence or absence of ice crystals was confirmed. Red pine seedlings artificially inoculated with the North American serotype, exposed to natural field conditions and artificially manipulated field conditions, developed symptoms of *Scleroderris* shoot blight when exposed to 44 or more days in which the temperature remained between -6 and +5 C or snow completely covered the seedlings or tree parts--a conducive day. Thus, an extended period of relatively mild canopy temperature during the winter appears to favor disease development. The conducive period--a period in which 44 or more conducive days occurred--could either occur in the winter after inoculation, or over the two winters after inoculation. The apparent latent period in the disease cycle may result from the need for winter conditions before symptom development can occur. The occurrence of symptoms primarily on lower branches, and the restriction of the disease to latitudes that receive sustained snow cover in the Lake States are consistent with this observation. Comparison of literature descriptions of outbreaks of the disease to weather records revealed a strong association between conducive periods, usually single conducive winters, and the occurrence of symptoms. The natural range of the disease may be restricted by the need for recurrence of conducive periods within 3 yr to avoid breaking the disease cycle. *Phytopathology*. Nov 1989. v. 79 (11). p. 1293-1301. Includes references. (NAL Call No.: DNAL 464.8 P56).

2184

**Containerized western larch seedling mortality, USDA Forest Service Nursery, Couer D'Alene, Idaho /R.L. James.**

James, R. L. Missoula, Mont. : U.S. Dept. of Agriculture, Forest Service, Northern Region, 1987. Caption title.~ "October 1987."~ At head of title: Forest Pest Management. 7 p. ; 28 cm. Bibliography: p. 7. (NAL Call No.: DNAL aSD11.U585 no.87-11).

2185

**Control of a molding-root rot complex of black walnut seedlings in storage.**

PLDIDE. Green, R.J. Jr. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. May 1985. v. 69 (5). p. 398-400. Includes references. (NAL Call No.: DNAL 1.9 P69P).

2186

**Control of brown spot needle blight infection on longleaf pine through benomyl treatment and breeding.**

GTRWD. Kais, A.G. Griggs, M.M. Washington, D.C. : The Service. USDA Forest Service general technical report WO. Paper presented at the conference on "Recent Research on Conifer Needle Diseases", October 14-18, 1984, Gulfport, Mississippi. Jan 1986. (50). p. 15-19. Includes references. (NAL Call No.: DNAL aSD11.U52).

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**Control of decay in above-water marine pilings.**

Washington, D.C. : The Service. Engineering field notes - United States Forest Service, Engineering Staff. Mar/Apr 1988. v. (20). p. 43-44. ill. (NAL Call No.: DNAL aSD388.A1U52).

2188

**Control of invertebrate pests through the chitin pathway.**

Mazzone, H.M. San Diego : Academic Press, c1987. *Biotechnology in invertebrate pathology and cell culture* / edited by Karl Maramorosch. p. 439-450. Includes references. (NAL Call No.: DNAL TP248.I57B56).

2189

**Control of mold and stain on methyl bromide fumigated red oak sapwood.**

FPJDA. Schmidt, E.L. Madison, Wis. : Forest Products Research Society. *Forest products journal*. Feb 1985. v. 35 (2). p. 61-62. Includes 10 references. (NAL Call No.: DNAL 99.9 F7662J).

2190

**Control of *Phytophthora* root and crown and trunk canker in walnut with metalaxyl and fosetyl Al.**

PLDRA. Matherson, M.E. Mircetich, S.M. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. Dec 1985. v. 69 (12). p. 1042-1043. Includes 12 references. (NAL Call No.: DNAL 1.9 P69P).

2191

**Control of tip moth by carbofuran reduces fusiform rust infection on loblolly pine /H.R. Powers, Jr., D.M. Stone.**

Powers, H. R. Stone, D. M. Asheville, N.C. : United States Dept. of Agriculture, Southeastern Forest Experiment Station, 1988? . Cover title.~ "July 1988"-- T.p. verso. 4 p. : ill. ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL

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2192

### **Controlling decay fungi colonizing air-seasoned Douglas-fir heartwood with high temperature exposures.**

Morrell, J.J. Corden, M.E.; Newbill, M.A.; Przybylowicz, P. Corvallis, Or. : Western Dry Kiln Clubs. Proceedings ... annual meeting - Western Dry Kiln Clubs. May 8, 1985. p. 90-96. Includes references. (NAL Call No.: DNAL 99.9 W5233).

2193

### **Controlling wood deterioration with fumigants: a review.**

FPJQA. Morrell, J.J. Corden, M.E. Madison, Wis. : Forest Products Research Society. Forest products journal. Literature review. Oct 1986. v. 36 (10). p. 27-34. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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### **Cyclaneusma needlecast in Pennsylvania: a review.**

GTRWD. Wenner, N.G. Merrill, W. Washington, D.C. : The Service. USDA Forest Service general technical report W0. Paper presented at the conference on "Recent Research on Conifer Needle Diseases", October 14-18, 1984, Gulfport, Mississippi. Jan 1986. (50). p. 35-40. Includes references. (NAL Call No.: DNAL aSD11.U52).

2195

### **Cylindrocladium crotalariae kills container-grown northern red oak (*Quercus rubra* L.).**

TPLNA. Oak, S.W. Triplett, J.D. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Spring 1985. v. 36 (2). p. 6-9. ill. Includes 7 references. (NAL Call No.: DNAL 1.962 C5T71).

2196

### **Decomposition of methylisothiocyanate in Douglas-fir heartwood.**

FPJQA. Zahora, A.R. Morrell, J.J. Madison, Wis. : Forest Products Research Society. Decomposition of the wood fumigant methylisothiocyanate (MIT) was studied in blocks of Douglas-fir heartwood. Decomposition was influenced by wood moisture content (MC), with decomposition rates estimated at 0.2, 0.9, and 1.6 percent per week of the total bound MIT for wood fumigated at 0, 12, and 60 percent MC, respectively. Dimethylthiourea and 2,4-dimethyl-1,2,4-thiadiazolidine-3,5-dithione, which formed during fumigation,

showed toxic activity against the decay fungus *Poria carbonica*. Elemental sulfur was also formed, but showed minimal fungitoxic activity. Some MIT remained in fumigated wood even after extensive aeration under dry conditions. This residual MIT rapidly volatilized at fungitoxic concentrations when wood was wetted and may provide residual protection against fungal invasion. Forest products journal. Oct 1988. v. 38 (10). p. 46-52. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

2197

### **Decreasing losses due to wood deterioration through proper forestry practices.**

Amburgey, T.L. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 105-110. Includes references. (NAL Call No.: DNAL 99.9 L935).

2198

### **Degradative pathways of lignin model compounds**

Higuchi, T. Orlando, Fla. : Academic Press, c1985. Biosynthesis and biodegradation of wood components / edited by Takayoshi Higuchi. Literature review. p. 557-578. Includes references. (NAL Call No.: DNAL TS932.B56).

2199

### **Demonstrating integrated pest management on National Forests in South Carolina and Georgia.**

XFGSA. Hoffard, W.H. Oak, S.W. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 35-44. ill., maps. Includes references. (NAL Call No.: DNAL aSD433.A53).

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### **Detection of fungal degradation at low weight loss by differential scanning calorimetry.**

WOFAU. Baldwin, R.C. Streisel, R.C. Madison : Society of Wood Science and Technology. Wood and fiber science. July 1985. v. 17 (3). p. 315-326. Includes references. (NAL Call No.: DNAL TA419.W6).

2201

### **Determining the effects of fusiform rust on forest productivity.**

Froelich, R.C. Bethesda, Md. : The Society. Proceedings of the...Society of American Foresters National Convention. "Economic and Social Development : A Role for Forests and Forestry Professionals," October 18-21, 1987, Minneapolis, Minnesota. 1988. p. 68-71. Includes references. (NAL Call No.: DNAL SD143.S64).



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2202

**Dimensional stability, decay resistance, and mechanical properties of veneer-faced low-density particleboards made from acetylated wood.**

WOOFAU. Rowell, R.M. Imamura, Y.; Kawai, S.; Norimoto, M. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Jan 1989. v. 21 (1). p. 67-79. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

2203

**Diplodia tip blight or dieback of pines.**

MUCBA. Adams, G. Bessette, P. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In subseries: Woody Ornamental Tips. May 1988. (2112). 7 p. ill. (NAL Call No.: DNAL 275.29 M58B).

2204

**Diseases of conifer seedlings caused by seed-borne Fusarium species.**

XGTIA. James, R.L. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Paper presented at the "Conifer Tree Seed in the Inland Mountain West Symposium," August 5-6, 1985, Missoula, Montana.~ Literature review. Apr 1986. (203). p. 267-271. Includes references. (NAL Call No.: DNAL aSD11.A48).

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**Diseases of eastern white pine.**

GTRWD. Hodges, C.S. Washington, D.C. : The Service. General technical report WD - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 93-98. Includes references. (NAL Call No.: DNAL aSD11.U52).

2206

**Diseases of landscape trees.**

Stipes, R.J. Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. In the series analytic: 1988-89 pest management guide for home ornamental plants / coordinated by J.M. Luna. Jan 1988. (456-004,rev.). p. 53-57. (NAL Call No.: DNAL S544.3.V8V52).

2207

**Dogwood anthracnose in northeastern United States.**

PLDIDE. Hibben, C.R. Daughtrey, M.L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Mar 1988. v. 72 (3). p. 199-203. ill., maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).

2208

**Douglas-fir seed treatments: effects on seed germination and seedborne organisms.**

Dumroese, R.K. James, R.L.; Wenny, D.L.; Gilligan, C.U. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station. U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 155-160. Includes references. (NAL Call No.: DNAL aSD11.A42).

2209

**The Dutch elm disease.**

McDaniel, M.C. Jones, B.F.; Tainter, F.H. Little Rock, Ark. : The Service. Leaflet EL - Arkansas University, Cooperative Extension Service. Apr 1987. (467). 8 p. ill. (NAL Call No.: DNAL 275.29 AR4LE).

2210

**Dutch elm disease, a model tree disease for biological control.**

Scheffer, R.J. Strobel G.A. Boca Raton, Fla. : CRC Press, 1988. Biocontrol of plant diseases / editors, K.G. Mukerji, K.L. Garg. Literature review. v. 2 p. 103-119. ill., maps. Includes references. (NAL Call No.: DNAL SB732.6.B56).

2211

**Dutch elm disease and elm yellows in central New York.**

PLDIDE. Lanier, G.N. Schubert, D.C.; Manion, P.D. St. Paul, Minn. : American Phytopathological Society. Plant disease. Mar 1988. v. 72 (3). p. 189-194. ill., maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).

2212

**Dwarf mistletoe as a host for brown felt blight in California.**

PLDRA. Scharpf, R.F. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1986. v. 70 (8). p. 798-799. Includes 10 references. (NAL Call No.: DNAL 1.9 P69P).

2213

**Economic effectiveness of operational therapeutic pruning for control of Dutch elm disease.**

JOARD. Baker, F.A. French, D.W. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Aug 1985. v. 11 (8). p. 247-249. Includes references. (NAL Call No.: DNAL SB436.J6).

2214

**Economics of dutch elm disease control: a model and case study.**

JFUSA. Baughman, M.J. Bethesda, Md. : Society of American Foresters. Journal of forestry. Sept 1985. v. 83 (9). p. 554-557. Includes references. (NAL Call No.: DNAL 99.8 F768).

2215

**Effect of a foliage disease caused by *Lirula abietis-concoloris* on growth of white fir in California.**

PLDRA. Scharpf, R.F. St. Paul, Minn. : American Phytopathological Society. Plant disease. Jan 1986. v. 70 (1). p. 13-14. ill. Includes 10 references. (NAL Call No.: DNAL 1.9 P69P).

2216

**Effect of *Coriolus versicolor* on physico-chemical properties of *Eucalyptus globulus* wood.**

WOSTBE. Bhandari, K.S. Bist, V. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1989. v. 23 (2). p. 163-169. Includes references. (NAL Call No.: DNAL SD433.A1W6).

2217

**Effect of dissolved oxygen concentration on the relative susceptibility of shortleaf and loblolly pine root tips to *Phytophthora cinnamomi*.**

PHYTA. Fraedrich, S.W. Tainter, F.H. St. Paul, Minn. : American Phytopathological Society. Exposure of shortleaf and loblolly pine lateral roots to oxygen concentrations of 0-0.25 mg/L for durations of 6-24 hr before inoculation increased root susceptibility to infection by *Phytophthora cinnamomi* as compared with roots maintained continuously under oxygen concentrations of 7 mg/L. Symptom development in lateral roots progressed more rapidly in roots that had been stressed with low oxygen than in roots maintained under high oxygen. Maintenance of pine seedlings at oxygen concentrations of 0.25-1.0 mg/L for 12 and 24 hr before inoculation had no subsequent effect on root susceptibility to infection or the rate of symptom development in infected roots of either pine species. Results suggest that essentially anaerobic conditions are necessary in the rhizosphere before pine root tips are

predisposed to attack by *P. cinnamomi*. Further, no evidence was found to support the hypothesis that differences in tolerance to low soil oxygen concentrations between loblolly and shortleaf pine are linked to their relative susceptibilities to infection by *P. cinnamomi*. *Phytopathology*. Oct 1989. v. 79 (10). p. 1114-1118. Includes references. (NAL Call No.: DNAL 464.8 P56).

2218

**The effect of drought on growth decline of loblolly pine on littleleaf sites.**

PLDIDE. Jacobi, J.C. Tainter, F.H.; Oak, S.W. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 294-297. Includes references. (NAL Call No.: DNAL 1.9 P69P).

2219

**Effect of environment, tree size and presence of wetwood symptoms on injectability of American elm.**

JOARD. Stack, R.W. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Aug 1988. v. 14 (8). p. 195-199. Includes references. (NAL Call No.: DNAL SB436.J6).

2220

**Effect of fall sowing and solar heating of soil on two conifer seedling diseases.**

TPLNA. McCain, A.H. Bega, R.V.; Jenkinson, J.L. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1986. v. 37 (4). p. 17-20. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

2221

**Effect of fluorescent-labeled lectins on visualization of decay fungi in wood sections.**

PHYTAJ. Morrell, J.J. Gibson, D.G.; Krahmer, R.L. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Mar 1985. v. 75 (3). p. 329-332. ill. Includes 11 references. (NAL Call No.: DNAL 464.8 P56).

2222

**Effect of inoculum density and fertilization on greenhouse screening of loblolly pine seedlings for resistance to fusiform rust.**

PHYTAJ. Carson, S.D. Young, C.H. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Aug 1987. v. 77 (8). p. 1186-1191. Includes references. (NAL Call No.: DNAL 464.8 P56).



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2223

**The effect of pH on decomposition of Mylone (dazomet) and tridipam to fungitoxic methylisothiocyanate in wood.**

WOOF AU. Morrell, J.J. Sexton, C.M.; Lebow, S. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1988. v. 20 (4). p. 422-430. Includes references. (NAL Call No.: DNAL TA419.W6).

2224

**Effect of phloem water relations on the growth of *Phytophthora cinnamomi* in *Eucalyptus marginata*.**

PHYTAU. Tippet, J.T. Crombie, D.S.; Hill, T.C. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Feb 1987. v. 77 (2). p. 246-250. Includes references. (NAL Call No.: DNAL 464.8 P56).

2225

**Effect of short-term storage of triadimefon-treated loblolly pine seed on incidence of fusiform rust.**

SJAFD. Kelley, W.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1988. v. 12 (1). p. 18-20. Includes references. (NAL Call No.: DNAL SD1.S63).

2226

**Effect of temperature on germination of conidia of *Gloeosporium aridum*.**

PNDA AZ. Redlin, S.C. Stack, R.W. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1986. v. 40. p. 63. Includes references. (NAL Call No.: DNAL 500 N813).

2227

**Effect of tree size, hole location, and wetwood fluxing on healing of injection wounds in American elms.**

JOARD. Stack, R.W. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Feb 1985. v. 11 (2). p. 45-47. Includes 7 references. (NAL Call No.: DNAL SB436.J6).

2228

**Effect of triadimefon on development of mycorrhizae from natural inoculum in loblolly pine nursery beds.**

SJAFD. Kelley, W.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1987. v. 11 (1). p. 49-52. Includes references. (NAL Call No.: DNAL

SD1.S63).

2229

**Effectiveness of ammoniacal copper zinc arsenate wood preservative as indicated by a soil-block analysis.**

FPJOA. Wilcox, W.W. Madison, Wis. : Forest Products Research Society. Forest products journal. July/Aug 1987. v. 37 (7/8). p. 62-63. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

2230

**Effects of extended prechilling on laboratory germination and fungal infection in seeds of white spruce and eastern white pine.**

TPLNA. Mittal, R.K. Wang, B.S.P.; Harmsworth, D. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1987. v. 38 (4). p. 6-9. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

2231

**Effects of fusiform rust on growth of planted slash pines.**

Burns, P.Y. Hu, S.C. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 231-234. Includes references. (NAL Call No.: DNAL aSD11.U57).

2232

**Effects of fusiform rust on survival and structure of Mississippi and Louisiana loblolly pine plantations.**

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PHYTAJ. Belanger, R.R. Manion, P.D.; Griffin, D.H. St. Paul, Minn. : American Phytopathological Society. Tissues from six aspen clones were cultured to produce plantlets from dormant buds. Plantlets of 1-2 cm were moisture stressed by adding various concentrations of mannitol to the growth medium. Inoculation of unwounded plantlets with ascospores of *Hypoxylon mammatum* resulted in visible signs of mycelium after 3-4 days. After 10 days, mycelial growth on controls and moderately stressed plants remained superficial; in contrast, highly stressed plants were invaded by the mycelium and exhibited necrotic lesions at the site of inoculation. The level of moisture stress needed for mycelium invasion and lesion development varied (-0.45 to -1.2 MPa) among the clones. Clonal differences observed could be applied in basic physiological studies or in aspen breeding programs for hypoxylon canker resistance. *Phytopathology*. Mar 1989. v. 79 (3). p. 315-317. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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XGTIA. Shea, P.J. Ogden, Utah : The Station.  
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(203). p. 256-259. Includes references. (NAL  
Call No.: DNAL aSD11.A48).

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### **Improving field performance of southern pine seedlings by treating with fungicides before storage.**

SJAFD. Barnett, J.P. Brissette, J.C.; Kais,  
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XFBOA. Mistretta, P.A. Bylin, C.V. New Orleans  
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### **Incorporating pest management technology into land management decisionmaking: Holly Springs National Forest, Mississippi.**

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PNGOA. Kay, T. Tigard, Or. : The Society.  
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### **Influence of disease management strategies on the production of white spruce in a forest tree nursery.**

FOSCA. Enebak, S.A. Palmer, M.A.; Blanchette,  
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Foresters. In a forest tree nursery dazomet,  
captan, thiram, captan-thiram combination, or  
silica sand did not reduce populations of three  
soilborne fungi. Preemergence mortality was  
greatest in nontreated plots, (56%) and least  
in plots treated with dazomet (46%). Nontreated

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plots had the most post-emergence damping off, (15%) and silica sand the least (3%). *Rhizoctonia solani* (AG-1) was isolated from 52% of damped-off seedlings collected while *Pythium* spp., *Fusarium* spp. and *Cylindrocladium* spp. were recovered from 24%, 23%, and 1% of the seedlings, respectively. Seedling mortality from May 18 to September 23, 1986, ranged from 28% in the dazomet plots to 61% in nontreated plots. At the end of the first growing season, plots treated with dazomet had significantly more seedlings than any other treatment. The incidence of stunted seedlings was greatest in plots treated with dazomet and least when seed was covered with silica sand. Silica sand or thiram treatments produced seedlings with the greatest total dry weights. *Forest science*, Dec 1989, v. 35 (4), p. 1006-1013. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Influence of fires, fungi and mountain pine beetles on development of a lodgepole pine forest in south-central Oregon.**  
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APMBA. Tonon, F. Odier, E. Washington, D.C. : American Society for Microbiology. Abstract: Veratryl alcohol, added as a supplement to cultures of *Phanerochaete chrysosporium*, enhanced ligninase activity through protection of the ligninase against inactivation by hydrogen peroxide produced by this fungus in cultures. In the presence of veratryl alcohol, the loss of ligninase activity observed in non-protein-synthesizing cultures (cycloheximide-treated) equaled the extracellular protein turnover. When cultures were not supplemented with veratryl alcohol, inactivation of ligninase by hydrogen peroxide added to protein turnover, resulting in a more

rapid loss of ligninase activity. Although all ligninase isoenzymes are sensitive to inactivation by hydrogen peroxide, only the isoenzyme of the highest specific activity (80.6 nkat . mg of protein-1; Mr, 41,800; pI, 3.96) was found to be protected by veratryl alcohol. The concentration of veratryl alcohol necessary for full protection of ligninase activity varied according to the concentration of hydrogen peroxide present in the medium, which depended on the nature of the carbon source (glucose or glycerol). It is proposed that the nature of the carbon source influences the overall ligninase activity not only directly, by affecting the rate and type of synthesized ligninase activity, but also by affecting the rate of hydrogen peroxide production, bringing about different rates of inactivation. *Applied and Environmental microbiology*, Feb 1988, v. 54 (2), p. 466-472. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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**Integrated forest pest management practices in South Carolina.**  
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FOSCA. Chadoeuf, J. Joannes, H.; Nandris, D.; Pierrat, J.C. Bethesda, Md. : Society of American Foresters. The spread of root diseases in rubber tree (*Hevea brasiliensis*) due to *Rigidoporus lignosus* and *Phellinus noxius* was investigated epidemiologically using data collected every 6 months during a 6-year survey in a plantation. The aim of the present study is to see what factors could predict whether a given tree would be infested at the following inspection. Using a qualitative regression method we expressed the probability of pathogenic attack on a tree in terms of three factors: the state of health of the surrounding trees, the method used to clear the forest prior to planting, and evolution with time. The effects of each factor were ranked, and the roles of the various classes of neighbors were established and quantified. Variability between successive inspections was small, and the



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method of forest clearing was important only while primary inocula in the soil were still infectious. The state of health of the immediate neighbors was most significant; more distant neighbors in the same row had some effect; interrow spread was extremely rare. This investigation dealt only with trees as individuals, and further study of the interrelationships of groups of trees is needed. For. SCI. 34(4):831-845. Forest science. Dec 1988. v. 34 (4). p. 831-845. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Phoma blight of fir and douglas-fir seedlings in a California nursery.**

PLDRA. Kliejunas, J.T. Allison, J.R.; McCain, A.H.; Smith, R.S. Jr. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1985. v. 69 (9). p. 773-775. ill. Includes 13 references. (NAL Call No.: DNAL 1.9 P69P).

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Sanderson, P.G. Worf, G.L. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Dec 1986. v. 4 (4). p. 134-138. ill. Includes 15 references. (NAL Call No.: DNAL SB1.J66).

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### **Physiological characteristics of a non-degradative isolate of *Postia* (=Poria) placenta.**

MYCOAE. Micales, J.A. Highley, T.L. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Mar/Apr 1989. v. 81 (2). p. 205-215. ill. Includes references. (NAL Call No.: DNAL 450 M99).

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### **Phytophthora cinnamomi infection in sand pine seedlings in Florida nurseries and effects on outplant survival.**

Barnard, E.L. Webb, R.S.; Gilly, S.P.; Lante, W.D. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 486-495. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

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### **Phytophthora shoot blight and canker disease of *Abies* spp.**

PLDRA. McCain, A.H. Scharpf, R.F. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1986. v. 70 (11). p. 1036-1037. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Duchesne, L.C. Campbell, S.E.; Koehler, H.; Peterson, R.L. Philadelphia, Pa. : Balaban Publishers. Symbiosis. 1989. v. 7 (2). p. 139-148. Includes references. (NAL Call No.: DNAL QH548.S9).

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### **Plant diseases: Dogwood anthracnose.**

WUEXA. Davidson, R.M. Jr. Byther, R.S. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Oct 1986. (972,rev.). 2 p. ill. (NAL Call No.: DNAL 275.29 W27P).

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Byram, T.D. Lowe, W.J.; McKinley, C.R. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 39-44. Includes references. (NAL Call No.: DNAL A99.9 F769).

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### **The Port Orford cedar.**

AMFOA. Cohn, L. Washington, D.C. : American Forestry Association. American forests. July 1986. v. 92 (7). p. 16-19, 63. ill. (NAL Call No.: DNAL 99.8 F762).

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### **Potential use of soil maps to estimate southern pine beetle risk.**

Lorio, P.L. Jr. Sommers, R.A. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 239-245. maps. Includes references. (NAL Call No.: DNAL aSD11.U57).

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### **Predicting survival and yield of unthinned slash and loblolly pine plantations with different levels of fusiform rust.**

Nance, W.L. Shoulders, E.; Dell, T.R. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 62-72. Includes references. (NAL Call No.: DNAL aSD11.U57).

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### **Principles of fungicide usage in container tree seedling nurseries.**

TPLNA. James, R.L. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Spring 1988. v. 39 (2). p. 22-25. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

2377

### **Properties of compression dewatered and baled aspen wood chip fuels.**

FPJDA. Steklenski, P.G. Schmidt, E.L.; Haygreen, J.G. Madison, Wis. : Forest Products Research Society. This project investigated basic relationships of the compression dewatering and baling of wood chips. The following fundamental aspects of experimental, compression dewatered chip bales were investigated: bale durability, moisture content (MC) and distribution, biodeterioration and internal heating. These factors were studied over time with bales of three different densities. Bale physical durability was dependent on restraining forces. As restraining forces decreased (i.e., lower density bales or as bales dried below the fiber saturation point), bale integrity declined. Bales in a controlled environment (65 degrees F and 50% RH) dried in a manner similar to solid wood, that is, rapidly within the first 30 days and then at a slower rate thereafter, reaching a final MC of 15 percent (dry basis) at 98 days. However, MC distribution within bales was highly variable and only partially dependent on time, bale density, and external insulation. It is likely that internal heating, due to respiration and microorganism activity, also influenced MC distribution. Bale density and insulation (simulated stacking) were found to influence the growth of wood-inhabiting organisms that in turn produced varying levels of heat within bales. However, several temperature peaks (up to 35 degrees F above ambient conditions) were found in all bales at approximately the same time which indicated that factors other than density and insulation also influenced temperature increases within bales. Bales with higher density and slower drying rates supported extensive growth of the white-rot fungus *Phanaerochaete chrysosporium*. Wood in such colonized areas was approximately 20 percent lower in specific gravity than uncolonized wood but retained the same caloric

value per unit of weight. Forest products journal. Feb 1989. v. 39 (2). p. 8-13. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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### **Prospects for control of Dutch elm disease--biological considerations.**

JOARD. Mazzone, H.M. Peacock, J.W. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Oct 1985. v. 11 (10). p. 285-292. Includes references. (NAL Call No.: DNAL SB436.J6).

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### **Prospects for oak wilt control in Texas.**

Apel, D.N. Lewis, R.L. Jr. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 60-68. ill. Includes references. (NAL Call No.: DNAL 99.9 L935).

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### **Protecting a research success story.**

McDonald, J. Fort Collins, Colo. : The Service. Forestry research west - United States Department of Agriculture, Forest Service. Mar 1986. p. 1-4. ill. (NAL Call No.: DNAL aSD11.F6).

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### **Protecting forest resources from disease.**

YAXAA. Powers, H.R. Jr. Washington, D.C. : U.S. Department of Agriculture. The Yearbook of agriculture. 1986. p. 221-225. ill. (NAL Call No.: DNAL 1 AG84Y).

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### **Protection of American chestnut with hypovirulent conidia of *Cryphonectria (Endothia) parasitica*.**

PLDIDE. Scibilia, K.L. Shain, L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1989. v. 73 (10). p. 840-843. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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### **Protection of blister rust-resistant western white pine cones from insect damage with permethrin and fenvalerate.**

XGTIA. Haverty, M.I. Shea, P.J. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Paper presented at the "Conifer Tree Seed in the Inland Mountain



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XFGTB. Hecht-Poinar, E.I. Costello, L.R.; Parmeter, J.R. Jr. Berkeley, Calif. : The Station. USDA Forest Service general technical report PSW - United States, Pacific Southwest Forest and Range Experiment Station. Paper presented at the "Symposium on Multiple-Use Management of California's Hardwood Resources," November 12-14, 1986, San Luis Obispo, California. Nov 1987. (100). p. 110-113. ill., maps. Includes references. (NAL Call No.: DNAL aSD11.A325).

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### **Protection of disease-resistant western white pine seed from insect damage.**

Haverty, M.I. Shea, P.J.; Stipe, L.E. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Jan 1988. v. 3 (1). p. 18-20. Includes references. (NAL Call No.: DNAL SD388.W6).

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### **Radial distribution of thujaplicins in old growth and second growth western red cedar (Thuja plicata Donn).**

WOSTBE. Nault, J. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1988. v. 22 (1). p. 73-80. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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### **Recent advances in control of brown spot in longleaf pine.**

Kais, A.G. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 83-90. Includes references. (NAL Call No.: DNAL 99.9 L935).

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PAWPA. Preston, A.F. Walcheski, P.J.; McKaig, P.A. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 30-39. Includes references. (NAL Call No.: DNAL 300.9 AM3).

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### **A reddish purple stain of red alder by Ceratocystis picea and its prevention.**

FPJOA. Morrell, J.J. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1987. v. 37 (2). p. 18-20. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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### **Reducing decay losses in high-value hardwoods--a guide for woodland owners and managers.**

XAAHA. Berry, F.H. Washington, D.C. : The Department. Agriculture handbook - United States Department of Agriculture. Dec 1985. (595, slightly rev.). 24 p. ill. Includes references. (NAL Call No.: DNAL 1 AG84AH).

2391

### **Reducing Fusarium top blight in 1-0 Douglas-fir by irrigation scheduling.**

Russell, K.W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 131-134. ill. Includes references. (NAL Call No.: DNAL aSD11.A42).

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### **Reducing internal and external decay of untreated Douglas-fir poles: a field test.**

FPJOA. Morrell, J.J. Smith, S.M.; Newbill, M.A.; Graham, R.D. Madison, Wis. : Forest Products Research Society. Forest products journal. Apr 1986. v. 36 (4). p. 47-52. Includes 24 references. (NAL Call No.: DNAL 99.9 F7662J).

2393

### **Reduction of laccase activity in dsRNA-containing hypovirulent strains of Cryphonectria (Endothia) parasitica.**

PHYTAJ. Rigling, D. Heiniger, U.; Hohl, H.R. St. Paul, Minn. : American Phytopathological Society. Double-stranded RNA (dsRNA) was detected in hypovirulent but not in virulent strains of Cryphonectria (Endothia) parasitica isolated in Switzerland. To test for phenol oxidase activity we grew the strains on malt extract agar containing tannic acid (Bavendamm test). All virulent strains produced a strong color reaction, indicating phenol oxidase activity, whereas hypovirulent strains showed weak or no activity. Transfer of dsRNA into virulent strains via hyphal anastomosis resulted in transfer of hypovirulence as tested

in the field and loss of phenol oxidase activity. Phenol oxidase is secreted into the medium at the advancing edge of the fungal colony. The enzyme was identified as phenol oxidase of the laccase type. The results suggest that laccase might play a role in pathogenicity of *C. parasitica* and is affected by dsRNA. *Phytopathology*, Feb 1989. v. 79 (2). p. 219-223. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**Reduction of *Phellinus weirii* inoculum in Douglas-fir stumps by the fumigants chloropicrin, Vorlex, or methylisothiocyanate.** FDSCA. Thies, W.G. Nelson, E.E. Bethesda, Md. : Society of American Foresters. *Forest science*. June 1987. v. 33 (2). p. 316-329. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**The reflectance method for testing the effectiveness of fungicides against surface mould growth on materials. I. Wood.** WOSTBE. Wazny, J. Rudniewski, P.; Krajewski, K.J.; Wazny, T. Secaucus, N.J. : Springer-Verlag. *Wood science and technology*. 1989. v. 23 (2). p. 179-189. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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**Regulation of cellulolytic activity in the white-rot fungus *Ischnoderma resinosum*.** MYCOAE. Sutherland, J.B. Bronx, N.Y. : The New York Botanical Garden. *Mycologia*. Jan/Feb 1986. v. 78 (1). p. 52-55. Includes references. (NAL Call No.: DNAL 450 M99).

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**Relation between combustion heat and chemical wood composition during whites and brown rot.** WOSTBE. Dobry, J. Dziurzynski, A.; Rypacek, V. Secaucus, N.J. : Springer-Verlag New York Inc. *Wood science and technology*. 1986. v. 20 (2). p. 137-144. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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**Relationship of acoustic emission during radial compression to mass loss from decay.** FPUOA. Beall, F.C. Wilcox, W.W. Madison, Wis. : Forest Products Research Society. *Forest products journal*. Apr 1987. v. 37 (4). p. 38-42. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

2399

**Relationship of growth reduction in Douglas-fir to infection by *Armillaria* root disease in southeastern British Columbia.** PHYTA. Bloomberg, W.J. Morrison, D.J. St. Paul, Minn. : American Phytopathological Society. Stem volume growth during consecutive 5-yr periods was measured in four Douglas-fir (*Pseudotsuga menziesii*) stands infected by *Armillaria ostoyae* in the interior cedar-hemlock and montane spruce biogeoclimatic zones of southeastern British Columbia. Growth, expressed as percent of stem volume at the start of each period, decreased significantly as resinosis increased due to mycelial colonization of the tree base. It was highest in resinosis severity class 0 (healthy), lowest in classes 3 (greater than 50-100% of basal circumference showing resinosis) and 4 (recently killed, 100% resinosis), and intermediate in classes 1 (no basal resinosis but roots infected within 1 m of root collar) and 2 (less than or equal to 50% basal resinosis). Differences among classes were greatest for the past 5-yr period and least, though still significant, for the past 15-yr period. Trends during the past 30 yr showed greater declines in severity classes 3 and 4 relative to class 0 than in classes 1 and 2. The period in which decline was initiated also occurred earlier (up to 25 yr ago) in classes 3 and 4 than in other classes. The percentage of basal circumference that was affected by lesion was strongly related to percent roots infected but only weakly to percent volume growth. The relation of percent basal circumference affected by lesion to percent volume growth was greatly strengthened by including the period in which decline was initiated in the regression equation. *Phytopathology*. Apr 1989. v. 79 (4). p. 482-487. maps. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**Residue retention and fungal invasion of chloropicrin-treated Douglas-fir.** FPUOA. Goodell, B.S. Krahmer, R.L.; Graham, R.D. Madison, Wis. : Forest Products Research Society. *Forest products journal*. Feb 1985. v. 35 (2). p. 45-49. ill. Includes 15 references. (NAL Call No.: DNAL 99.9 F7662J).

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**Respirometric testing of decay resistance of discolored root wood.** PHYTAJ. Worrall, J.J. Harrington, T.C. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. June 1988. v. 78 (6). p. 676-682. Includes references. (NAL Call No.: DNAL 464.8 P56).



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### **Rhabdocline needlecast and its control.**

Clarke, B.B. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1987. (183). 2 p. ill. (NAL Call No.: DNAL S544.3.N5F7).

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### **Risk prediction of loblolly pine decline on littleleaf disease sites in South Carolina.**

PLDIDE. Oak, S.W. Tainter, F.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 289-293. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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### **Role of insects and diseases in a jack pine provenance study.**

GRLEA. Hodson, A.C. French, D.W.; Jensen, R.A. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Winter 1986. v. 19 (4). p. 239-247. Includes references. (NAL Call No.: DNAL QL461.M5).

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### **The role of silviculture in control of Scleroderris canker.**

Skilling, D.D. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. Meeting held Oct 16-19, 1988, Rochester, New York. 1989. p. 178-181. Includes references. (NAL Call No.: DNAL SD143.S64).

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### **Role of veratryl alcohol in regulating ligninase activity in Phanerochaete chrysosporium.**

APMBA. Faison, B.D. Kirk, T.K.; Farrell, R.L. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. Aug 1986. v. 52 (2). p. 251-254. Includes 19 references. (NAL Call No.: DNAL 448.3 AP5).

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### **Root disease of containerized conifer seedlings, Western Forest Systems Nursery, Lewiston, Idaho /R.L. James.**

James, R. L. Missoula, Mont. : U.S. Dept. of Agriculture, Forest Service, Northern Region. 1988. Caption title.~ "January 1988."~ At head of title: Forest Pest Management. 5 p. ; 28 cm. Bibliography: p. 5. (NAL Call No.: DNAL aSD11.U585 no.88-3).

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### **Root disease response to stand culture.**

XGTIA. Hagle, S.K. Goheen, D.J. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 303-309. Includes references. (NAL Call No.: DNAL aSD11.A48).

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### **Sapwood inhabiting canker fungi in healthy and oak wilt-infected Quercus spp.**

JMSSA. Lewis, R. Jr. Jackson, Miss. : The Academy. Journal of the Mississippi Academy of Sciences. 1985. v. 30. p. 93-97. Includes references. (NAL Call No.: DNAL 500 M697).

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### **Screening hybrid poplars in vitro for resistance to leaf spot caused by Septoria musiva.**

PLDIDE. Ostry, M.E. McRoberts, R.E.; Ward, K.T.; Resendez, R. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1988. v. 72 (6). p. 497-499. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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### **Screening jack pine seedlings for resistance to Endocronartium harknessii.**

PLDIDE. Burnes, T.A. Blanchette, R.A.; Wang, C.G.; French, D.W. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1988. v. 72 (7). p. 614-621. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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### **Screening mimosa (Albizia julibrissin) seedlings for resistance to nematodes and fusarium wilt.**

PLDRA. McArdle, A.J. Santamour, F.S. Jr. St. Paul, Minn. : American Phytopathological Society. Plant disease. Mar 1986. v. 70 (3). p. 249-251. Includes 15 references. (NAL Call No.: DNAL 1.9 P69P).

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### **A search for aecial hosts of Melampsora medusae among some conifers grown in the eastern United States.**

PLDIDE. Shain, L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1988. v. 72 (10). p. 904-906. Includes references. (NAL Call No.: DNAL 1.9 P69P).

2414

**Seed treatment and foliar fungicides used to control yellow-poplar anthracnose in a forest nursery, 1985.**

FNETD. Affeltranger, C.E. Filer, T.H. s.l. The Society. Fungicide and nematicide tests : results - American Phytopathological Society. 1986. v. 41. p. 178. (NAL Call No.: DNAL 464.9 AM31R).

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**Seed treatment with Bayleton reduces fusiform rust in forest nurseries.**

HARAA. Kelley, W.D. Auburn, Ala. : The Station. Highlights of agricultural research - Alabama, Agricultural Experiment Station. Spring 1985. v. 32 (1). p. 8. ill. (NAL Call No.: DNAL 100 AL1H).

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**Selective medium for isolating Sphaeropsis sapinea.**

PHYTAU. Swart, W.J. Wingfield, M.J.; Knox-Davies, P.S. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Oct 1987. v. 77 (10). p. 1387-1389. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**A sensitive dot immunoassay employing monoclonal antibodies for detection of Sirococcus strobilinus in spruce seed.**

PLDIDE. Mitchell, L.A. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1988. v. 72 (8). p. 664-667. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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**Service life of Douglas-fir piles: methods for protecting cutoff tops from decay.**

FPUOA. Helsing, G.G. Morrell, J.J.; Graham, R.D. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1986. v. 36 (2). p. 21-24. Includes 8 references. (NAL Call No.: DNAL 99.9 F7662J).

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**Seven chemicals fail to protect ponderosa pine from Armillaria root disease in central Washington.**

XPNWA. Filip, G.M. Roth, L.F. Portland, Or. : The Station. PNW-RN research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. July 1987. (460). 8 p. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

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**Shellrot control in western redcedar: potential replacements for pentachlorophenol spray.**

FPUOA. Scheffer, T.C. Morrell, J.J.; Newbill, M.A. Madison, Wis. : Forest Products Research Society. Forest products journal. July/Aug 1987. v. 37 (7/8). p. 51-54. (NAL Call No.: DNAL 99.9 F7662J).

2421

**Shoot blight and collar rot of Pinus resinosa caused by Sphaeropsis sapinea in forest tree nurseries.**

PLDRA. Palmer, M.A. Nicholls, T.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1985. v. 69 (9). p. 739-740. ill. Includes 18 references. (NAL Call No.: DNAL 1.9 P69P).

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**Silicon content in wood and bark of baldcypress compared to loblolly pine and southern red oak.**

TKASAT. Bowers, L.J. Melhuish, J.H. Jr. Louisville, Ky. : The Academy. Transactions of the Kentucky Academy of Science. Mar 1988. v. 49 (1/2). p. 1-7. maps. Includes references. (NAL Call No.: DNAL 500 K41).

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**Silvicultural practices that reduce losses from fusiform rust.**

Powers, H.R. Jr. Miller, T.; Belanger, R. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. Meeting held Oct 16-19, 1988, Rochester, New York. 1989. p. 182-186. Includes references. (NAL Call No.: DNAL SD143.S64).

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**A simple model of selection for fungicide resistance in plant pathogen populations.**

PHYTAU. Chin, K.M. St. Paul, Minn. : American Phytopathological Society. Phytopathology. May 1987. v. 77 (5). p. 666-669. Includes references. (NAL Call No.: DNAL 464.8 P56).

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Cordell, C.E. Kelley, W.D. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 496-504. ill. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).



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2426

**Soil solar heating for control of damping-off fungi and weeds at the Colorado State Forest Service Nursery.**

TPLNA. Hildebrand, D.M. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Winter 1985. v. 36 (1). p. 28-34. ill. Includes 24 references. (NAL Call No.: DNAL 1.962 C5T71).

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**Soil solar heating for reduction in populations of Pythium, Fusarium, nematodes, and weeds at the U.S. Forest Service Bessey Tree Nursery, Halsey, Nebraska.**

Hildebrand, D.M. Denver : The Service. Technical report R2 - United States Forest Service, Forest Pest Management. Sept 1985. (34). 20 p. Includes references. (NAL Call No.: DNAL aSD11.A422).

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PLDIDE. Ostry, M.E. Skilling, D.D. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1988. v. 72 (8). p. 724-727. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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**Sources of inoculum of Sphaeropsis sapinea in forest tree nurseries.**

PHYTAJ. Palmer, M.A. McRoberts, R.E.; Nicholls, T.H. St. Paul, Minn. : American Phytopathological Society. Phytopathology. June 1988. v. 78 (6). p. 831-835. Includes references. (NAL Call No.: DNAL 464.8 P56).

2430

**Spatial distribution and development of root sprouts in Fagus grandifolia (Fagaceae).**

AJBOA. Jones, R.H. Raynal, D.J. Baltimore, Md. : Botanical Society of America. American journal of botany. Dec 1986. v. 73 (12). p. 1723-1731. Includes references. (NAL Call No.: DNAL 450 AM36).

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**Status of elm preservation in New England.**

RHODA. Ellmore, G.S. Phair, W.E. Cambridge, Mass. : New England Botanical Club. Rhodora. Jan 1987. v. 89 (857). p. 27-33. ill. Includes references. (NAL Call No.: DNAL 450 R34).

2432

**Strength tests on acetylated aspen flakeboards exposed to a brown-rot fungus.**

WOODFAJ. Rowell, R.M. Youngquist, J.A.; Imamura, Y. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Apr 1988. v. 20 (2). p. 266-271. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

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**The striped ambrosia beetle.**

Borden, J.H. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 579-596. ill. Includes references. (NAL Call No.: DNAL SB761.D96).

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**Structural properties of double-stranded RNAs associated with biological control of chestnut blight fungus.**

PNASA. Tartaglia, J. Paul, C.P.; Fulbright, D.W.; Nuss, D.L. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Dec 1986. v. 83 (23). p. 9109-9113. ill. Includes 49 references. (NAL Call No.: DNAL 500 N21P).

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**Subtropical testing of ACA-treated hardwood particleboard.**

FPJDA. Hall, H.J. Gjovik, L.R.; Schmidt, E.L.; Gertjeansen, R.O.; Laundrie, J.F. Madison, Wis. : Forest Products Research Society. Forest products journal. Apr 1987. v. 37 (4). p. 49-53. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662U).

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**Survival and growth of outplanted pine seedlings after mycorrhizae were inhibited by use of triadimefor in the nursery.**

SJAJD. Rowan, S.J. Kelley, W.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1986. v. 10 (1). p. 21-23. Includes references. (NAL Call No.: DNAL SD1.S63).

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NOSCA. Thies, W.G. Nelson, E.E. Pullman, Wash. : Washington State University Press. Northwest science. Feb 1987. v. 61 (1). p. 60-64. Includes references. (NAL Call No.: DNAL 470)

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**Susceptibility of ponderosa pine to the needle cast fungus *Lophodermium baculiferum*.**

XFIPA. Hoff, R.J. Ogden, Utah : The Station. USDA Forest Service research paper INT - Intermountain Research Station. Feb 1988. (386). 6 p. maps. Includes references. (NAL Call No.: DNAL A99.9 F764U).

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JOARD. Himelick, E.B. Neely, D. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. June 1988. v. 14 (6). p. 137-141. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Technology transfer through demonstration projects: hazard rating stands for southern pine beetle and annosus root rot in Alabama.**

XFGSA. Hyland, J.R. Kucera, R.C. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 7-11. ill. Includes references. (NAL Call No.: DNAL aSD433.A53).

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**Temporal and spatial patterns of fusiform rust epidemics in young plantations of susceptible and resistant slash and loblolly pines.**

PLDRA. Schmidt, R.A. Holley, R.C.; Klapproth, M.C.; Miller, T. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1986. v. 70 (7). p. 661-666. maps. Includes 24 references. (NAL Call No.: DNAL 1.9 P69P).

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**Temporal and spatial variation in infection of lodgepole pine by western gall rust.**

PLDIDE. Kamp, B.J. van der. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1988. v. 72 (9). p. 787-790. Includes references. (NAL Call No.: DNAL 1.9

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JOARD. Lanier, G.N. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1988. v. 14 (9). p. 229-232. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Time and materials needed to survey, inject systematic fungicides, and install root-graft barriers for Dutch elm disease management.**

Cannon, W.N. Jr. Barger, J.H.; Kostichka, C.J. Broomall, Pa. : The Station. USDA Forest Service Research Paper NE - United States, Northeastern Forest Experiment Station. 1986. (585). 6 p. Includes references. (NAL Call No.: DNAL A99.9 F7622UN).

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**Tissue culture and leaf spot bioassays as variables in regression models explaining *Hypoxyton mammatum* incidence on *Populus tremuloides* clones in the field.**

PHYTAU. Belanger, R.R. Falk, S.P.; Manion, P.D.; Griffin, D.H. St. Paul, Minn. : American Phytopathological Society. Regression models were used to interpret the relationships among sensitivity of aspen to metabolites produced by *Hypoxyton mammatum*, disease incidence in the field, and several other clone and site variables. Twenty-nine naturally occurring aspen clones in central New York were intensively surveyed. Dormant buds of 10 clones representing the range of variation in infection were cultured and bioassayed with culture filtrates of *H. mammatum* to compare with bioassays of leaves collected in the field. Bioassay systems based on tissue culture and field collections demonstrated the occurrence of clonal differences in response to metabolites produced by *H. mammatum*. High positive correlations among bioassays, with various fungal isolates, supported the conclusion that clonal response to metabolites is genetically controlled. However, low correlations of toxin assays with various measures of disease did not support the theory of a direct relationship between disease incidence and toxin assays. Rather, an interaction of the toxin assay with other clonal and site variables in regression models was required to explain the variation in disease incidence in the field. Phytopathology. Mar 1989. v. 79 (3). p. 318-321. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).



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PNASA. Lam, B.S. Strobel, G.A.; Harrison, L.A.; Lam, S.T. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Sept 1987. v. 84 (18). p. 6447-6541. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

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**Trap trees for control of Dutch elm disease.**  
JOARD. Lanier, G.N. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. May 1989. v. 15 (5). p. 105-111. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Treatment of pitch canker on Monterey pine with fungisol injection.**  
JOARD. Tjosvold, S.A. McCain, A.H. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. May 1988. v. 14 (5). p. 135-136. (NAL Call No.: DNAL SB436.J6).

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**Triadimefon affects *Pisolithus ectomycorrhizal* development, fusiform rust, and growth of loblolly and slash pines in nurseries /Donald H. Marx and Charles E. Cordell.**  
Marx, Donald Henry, 1936-. Cordell, Charles E. Asheville, N.C. : U.S. Dept. of Agriculture, Forest Service, Southeastern Forest Experiment Station, 1987. Cover title.~ "October 1987"--P. 2 of cover. 14 p. : ill. ; 28 cm. Bibliography: p. 8. (NAL Call No.: DNAL A99.9 F7623U no.267).

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**Triadimefon and *Pisolithus ectomycorrhizae* affect second-year field performance of loblolly pine.**  
Marx, D.H. Asheville, N.C. : The Station. Research note SE - USDA Forest Service, Southeastern Forest Experiment Station. Dec 1987. (349). 6 p. Includes references. (NAL Call No.: DNAL aSD12.A13R47).

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SJAFD. Rowan, S.J. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1986. v. 10 (2). p. 112-114. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Trials of two powdered preservatives for phenol-formaldehyde-bonded and polymeric-isocyanate-bonded aspen structural composite board.**  
FPUOA. Schmidt, E.L. Gertjeansen, R.O. Madison, Wis. : Forest Products Research Society. Forest products journal. Mar 1988. v. 38 (3). p. 19-21. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Trichoderma species from Douglas-fir stumps and roots infested with *Phellinus weirii* in the western Cascade Mountains of Oregon.**  
MYCOAE. Goldfarb, B. Nelson, E.E.; Hansen, E.M. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Jan/Feb 1989. v. 81 (1). p. 134-138. Includes references. (NAL Call No.: DNAL 450 M99).

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**Trichoderma species from fumigated Douglas-fir roots decayed by *Phellinus weirii*.**  
MYCOAE. Nelson, E.E. Goldfarb, B.; Thies, W.G. Bronx, N.Y. : The New York Botanical Garden. Mycologia. May/June 1987. v. 79 (3). p. 370-374. Includes references. (NAL Call No.: DNAL 450 M99).

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MYCOAE. Goldfarb, B. Nelson, E.E.; Hansen, E.M. Bronx, N.Y. : The New York Botanical Garden. Mycologia. May/June 1989. v. 81 (3). p. 375-381. Includes references. (NAL Call No.: DNAL 450 M99).

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CAGRA. Hecht-Poinar, E.I. Costello, L.R.; Parmeter, J.R. Jr. Berkeley, Calif. : The Station. California agriculture - California Agricultural Experiment Station. Jan/Feb 1989. v. 43 (1). p. 15-16. ill. (NAL Call No.: DNAL 100 C12CAG).

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**Update on O.S.U. stain-control trials on western woods.**  
Miller, D.J. Morrell, J.J. Corvallis, Or. : School of Forestry, Oregon State University. Proceedings - Western Dry Kiln Clubs. Meeting held May 20-22, 1987.~ Includes statistical data. 1987. p. 39-44. Includes references. (NAL Call No.: DNAL 99.9 W5233).

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APMBA. Reh, U. Kraepelin, G.; Lamprecht, I. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. Nov 1986. v. 52 (5). p. 1101-1106. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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McElroy, F.D. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 139-146. (NAL Call No.: DNAL ASD11.A42).

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**Using computer graphics to assess the visual impact of limb rust in ponderosa pine.**  
UTSCB. Baker, F.A. Rabin, D. Logan, Utah : The Station. Utah Science - Utah Agricultural Experiment Station. Winter 1988. v. 49 (4). p. 98-102. ill. Includes references. (NAL Call No.: DNAL 100 UT1F).

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**Volatile emissions from Douglas-fir heartwood treated with Vapam or methylisothiocyanate.**  
FPJ0A. Morrell, J.J. Lebow, S.T. Madison, Wis. : Forest Products Research Society. Fumigants, which play an important role in arresting and preventing decay of wood exposed to the weather, have recently been used to control decay in building timbers. The possibility exists that chemicals could migrate through the wood and be emitted inside buildings, thus posing a health hazard. Emission rates from blocks of Douglas-fir heartwood, treated with Vapam or methylisothiocyanate (MIT), were measured by placing the blocks in tanks under a stable air-flow and then analyzing air samples by gas chromatography at regular intervals. Three sulfur compounds were detected: carbon disulfide, carbonyl sulfide, and MIT. Emissions from wood treated with MIT were generally higher than those from Vapam-treated wood. Although our results indicated that emissions were detectable for at least 1 year after treatment, levels were extremely low and should not be a problem in storage buildings or in factories where air exchange is high. Fumigant treatment of wood used in tightly sealed buildings that are continually inhabited is not recommended. Forest products journal. Feb 1989. v. 39 (2). p. 41-44. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Wood-decay fungi associated with subterranean termites (Rhinotermitidae) in Louisiana.**  
PESWA. Waller, D.A. La Fage, J.P.; Gilbertson, R.L.; Blackwell, M. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. July 1987. v. 89 (3). p. 417-424. Includes references. (NAL Call No.: DNAL 420 W27).

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WOODFAJ. Morrell, J.J. Zabel, R.A. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1985. v. 17 (1). p. 132-143. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Wound response of *Ulmus americana* I. Results of chemical injection in attempts to control Dutch elm disease.**  
JOARD. Andersen, J.L. Campana, R.J.; Shigo, A.L.; Shortle, W.C. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. May 1985. v. 11 (5). p. 137-142. ill. Includes 27 references. (NAL Call No.: DNAL SB436.J6).

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MUCBA. Adams, G.C. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Oct 1987. (2023). 72 p. ill., maps. (NAL Call No.: DNAL 275.29 M58B).



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**The effect of wetwood on lumber drying times and rates: an exploratory evaluation with longitudinal gas permeability.**  
WOOFAU. Ward, J.C. Madison : Society of Wood Science and Technology. Wood and fiber science. Literature review. Apr 1986. v. 18 (2). p. 288-307. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

2468

**Effects of virus and mycoplasma-like organism infection on green and white ash.**  
PHYTA. Ferris, M.A. Castello, J.D.; Sinclair, W.A. St. Paul, Minn. : American Phytopathological Society. White ash (*Fraxinus americana*) and green ash (*F. pennsylvanica*) seedlings were inoculated with tobacco mosaic virus, tobacco ringspot virus (TRSV), tomato ringspot virus, and mycoplasma-like organisms (MLOs) alone and in all combinations. After three cycles of growth and dormancy, one or more pathogens were detected in 190 plants. TRSV was associated with chlorotic mottling in both species and with chlorotic spots, ringspots, and vein yellowing in green ash. Virus symptoms were more severe in green than white ash. MLOs were associated with interveinal chlorosis, dwarfing and glossiness of leaves, and production of axillary shoots. These and other symptoms have been observed in naturally infected ash. MLO, but not virus infection, was associated with suppressed growth, more so in white than in green ash. Neither synergistic nor additive effects of multiple pathogen infection on growth or symptom development in ash were detected. *Phytopathology*. May 1989. v. 79 (5). p. 579-583. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**Elm yellows (= elm phloem necrosis).**  
JOARD. Holmes, F.W. Urbana, Ill. : International Society of Arboriculture. *Journal of arboriculture*. July 1987. v. 13 (7). p. 188. (NAL Call No.: DNAL SB436.J6).

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Moore, L.W. Corvallis, Or. : The Service. *Ornamentals northwest - Cooperative Extension Service, Oregon State University. Literature review*. Mar/Apr 1988. v. 12 (2). p. 4-16. Includes references. (NAL Call No.: DNAL SB403.07).

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**Variability in ice nucleation strains of *Pseudomonas syringae* isolated from diseased woody plants in Pacific Northwest nurseries.**  
PLDRA. Baca, S. Canfield, M.L.; Moore, L.W. St. Paul, Minn. : American Phytopathological Society. *Plant disease*. May 1987. v. 71 (5). p. 412-415. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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Hagle, Susan K. Ogden, UT : U.S. Dept. of Agriculture, Forest Service, Intermountain Research Station, 1989. Cover title. ~ "June 1989.". 35 p. : ill. (some col.) ; 28 cm. Includes bibliographical references (p. 14-16). (NAL Call No.: DNAL aSD11.A48 no.261).

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**Effect of *Lophodermium seeditiosum* on growth of pine nursery seedlings in Wisconsin.**

PLDIDE. Ostry, M.E. Nicholls, T.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1989. v. 73 (10). p. 798-800. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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**Effects of virus and mycoplasma-like organism infection on green and white ash.**

PHYTA. Ferris, M.A. Castello, J.D.; Sinclair, W.A. St. Paul, Minn. : American Phytopathological Society. White ash (*Fraxinus americana*) and green ash (*F. pennsylvanica*) seedlings were inoculated with tobacco mosaic virus, tobacco ringspot virus (TRSV), tomato ringspot virus, and mycoplasma-like organisms (MLOs) alone and in all combinations. After three cycles of growth and dormancy, one or more pathogens was detected in 190 plants. TRSV was associated with chlorotic mottling in both species and with chlorotic spots, ringspots, and vein yellowing in green ash. Virus symptoms were more severe in green than white ash. MLOs were associated with interveinal chlorosis, dwarfing and glossiness of leaves, and production of axillary shoots. These and other symptoms have been observed in naturally infected ash. MLO, but not virus infection, was associated with suppressed growth, more so in white than in green ash. Neither synergistic nor additive effects of multiple pathogen infection on growth or symptom development in ash were detected. Phytobiology. May 1989. v. 79 (5). p. 579-583. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**Planted longleaf pine seedlings respond to herbaceous weed control using herbicides.**

SJAFD. Nelson, L.R. Zutter, B.R.; Gjerstad, D.H. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Nov 1985. v. 9 (4). p. 236-240. ill. Includes references. (NAL Call No.: DNAL SD1.S63).

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## **Allelopathic effects of shrubs of the sand pine scrub on pines and grasses of the sandhills.**

FOSCA. Richardson, D.R. Williamson, G.B. Bethesda, Md. : Society of American Foresters. Aqueous leachates prepared monthly from foliage of eight species and from litter of two of them from Florida's sand pine scrub community were tested for potential inhibitory activity on four receiver species: three grasses native to Florida's sandhill community (*Andropogon gyrans*, *Schizachyrium scoparium*, and *Leptochloa dubia*) and commercial lettuce (*Lactuca sativa*). Seed germination of the grasses was inhibited significantly by all ten leachates. Inhibition varied with month of preparation of the samples and was highly correlated with monthly precipitation. However, only two of ten leachates significantly inhibited radicle growth of the grasses, with a seasonal peak in late spring before the rainy season. Leachates from speciesdominant on open scrub sites were much more inhibitory than those from mature scrub. Lettuce seed germination was inhibited significantly, whereas radicle length was stimulated; neither effect exhibited significant seasonal variation. *Andropogon gyrans* watered with runoff from leaf misting of potted *Ceratiola ericoides* and *Conradina canescens* had significantly lower dry weights than control seedlings receiving distilled water. In a field transplant experiment designed to control resource competition, seedling pines (*P. palustris*, *P. elliotii*, *P. clausa*) and plugs of wiregrass (*Aristida stricta*) grew more slowly at scrub sites than at sandhill sites. Chemicals released from the shrubs may deter pines and grasses that otherwise provide fuel for surface fires which cause shrub mortality. For Sci. 34(3):592-605. Forest science. Sept 1988. p. 592-605. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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## **Characteristics of trees predisposed to die.**

BISNA. Waring, R.H. Washington, D.C. : The Institute. BioScience - American Institute of Biological Sciences. Sept 1987. v. 37(8). p. 569-574. ill. Includes references. (NAL Call No.: DNAL 500 AM322A).

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## **Chlorophyll a fluorescence and photosynthetic and growth responses of *Pinus radiata* to phosphorus deficiency, drought stress, and high CO<sub>2</sub>.**

PLPHA. Conroy, J.P. Smillie, R.M.; Koppers, M.; Bevege, D.I.; Barlow, E.W. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. June 1986. v. 81(2). p. 423-429. Includes 25 references. (NAL Call No.: DNAL 450 P692).

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PCBPB. Mersie, W. Singh, M. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. May 1987. v. 28(1). p. 114-120. Includes references. (NAL Call No.: DNAL SB951.P49).

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## **Distribution of magnesium between chlorophyll and other photosynthetic functions in magnesium deficient "sun" and "shade" leaves of poplar.**

JPNUDS. Dorenstouter, H. Pieters, G.A.; Findenegg, G.R. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1985. v. 8(12). p. 1089-1101. Includes references. (NAL Call No.: DNAL QK867.J67).

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## **Effect of excess aluminum and manganese on Norway spruce seedlings as related to magnesium nutrition.**

JPNUDS. Hecht-Buchholz, C. Jorns, C.A.; Keil, P. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Tenth International Plant Nutrition Colloquium," August 4-9, 1986, Beltsville, Maryland. 1987. v. 10(9116). p. 1103-1110. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

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## **Effect of fertilizers and ectomycorrhizal inoculum on stunted Douglas firs.**

Hall, I.R. Garden, E. Corvallis, Or. : Oregon State University, Forest Research Laboratory. 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 224. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

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**Effects of seed handling, pre-germination and planting positions on tree seedling root and stem development.**

Appleton, B.L. Whitcomb, C.E.; Akers, S.W. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1986. v. 4 (3). p. 69-72. ill. Includes 4 references. (NAL Call No.: DNAL SB1.J66).

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TPLNA. Croghan C.F. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Spring 1985. v. 36 (2). p. 10-21. Includes 2 references. (NAL Call No.: DNAL 1.962 C5T71).

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TAPPA. Tomlinson, G.H. Norcross, Ga. : The Technical Association of the Pulp and Paper Industry. Tappi journal. Mar 1987. v. 70 (3). p. 31-35. Includes references. (NAL Call No.: DNAL 302.8 T162).

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JOARD. Krizek, D.T. Dubik, S.P. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Literature review. Feb 1987. v. 13 (2). p. 47-56. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Investigations of nitrogen as a possible contributor to red spruce (*Picea rubens* Sarg.) decline.**

Friedland, A.J. Hawley, G.J.; Gregory, R.A. St. Paul, Minn. : Acid Rain Foundation, c1985. Air pollutants effects on forest ecosystems : May 8-9, 1985, St. Paul, MN / major sponsors, The National Acid Precipitation Assessment Program, USDA Forest Service ... et al. ; coordinated by the Ac. p. 95-106. Includes references. (NAL Call No.: DNAL QH545.A3A5).

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**Methods for measuring water status and reducing transpirational water loss in trees.**

JOARD. Roberts, B.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Literature review. Feb 1987. v. 13 (2). p. 56-61. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Modeling the climate dynamics of tree death.**

BISNA. Michaels, P.J. Hayden, B.P. Washington, D.C. : The Institute. BioScience - American Institute of Biological Sciences. Sept 1987. v. 37 (8). p. 603-610. ill., maps. Includes references. (NAL Call No.: DNAL 500 AM322A).

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**Report on our stressed-out forests.**

AMFOA. Burnett, H. Washington, D.C. : American Forestry Association. American forests. Mar/Apr 1989. v. 95 (3/4). p. 21-25, 78. ill. (NAL Call No.: DNAL 99.8 F762).

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**Response of Cornus Florida to moisture stress.**

JOARD. Williams, J.D. Ponder, H.G.; Gilliam, C.H. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1987. v. 13 (4). p. 98-101. Includes references. (NAL Call No.: DNAL SB436.J6).

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JOARD. Kramer, P.J. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Feb 1987. v. 13 (2). p. 33-38. Includes references. (NAL Call No.: DNAL SB436.J6).

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Ball, J. Van Nuys, Calif. : Gold Trade Publications. Arbor age. Nov 1988. v. 8 (11). p. 12-14. ill. (NAL Call No.: DNAL SB435.5.A645).

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**Soil moisture and absorption of water by tree roots.**

JOARD. Kozlowski, T.T. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Literature review. Feb 1987. v. 13 (2). p. 39-46. Includes references. (NAL Call No.: DNAL SB436.J6).



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JOARD. Whitlow, T.H. Bassuk, N.L. Urbana, Ill.  
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JOARD. Weaver, M.J. Stipes, R.J. Urbana, Ill. ;  
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## Acid rain and the spaceship earth.

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## Acidic deposition and tree growth. I. The use of stem analysis to study historical growth patterns.

JEVQAA. LeBlanc, D.C. Raynal, D.J.; White, E.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1987. v. 16 (4). p. 325-333. Includes references. (NAL Call No.: DNAL QH540.J6).

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## Acidic deposition and tree growth. II. Assessing the role of climate in recent growth declines.

JEVQAA. LeBlanc, D.C. Raynal, D.J.; White, E.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1987. v. 16 (4). p. 334-340. Includes references. (NAL Call No.: DNAL QH540.J6).

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## Acute ozone stress on eastern cottonwood (*Populus deltoides* Bartr.) and the pest potential of the aphid, *Chaitophorus populicola* Thomas (Homoptera: Aphididae).

EVETEX. Coleman, J.S. Jones, C.G. College Park, Md. : Entomological Society of America. The effect of acute ozone exposure of eastern cottonwood (*Populus deltoides* Bartr.) on the survivorship, reproduction, and development of the aphid *Chaitophorus populicola* Thomas (Homoptera: Aphididae) was investigated. Cottonwoods were exposed to 397 microgram/m<sup>3</sup> (0.20 ppm) ozone or charcoal-filtered air and infested with aphids on leaf plastochron index 5, 40 h after fumigation. Aphid performance was not significantly different on plants exposed to ozone compared with charcoal-filtered air-treated control plants. These data do not support the notion that aphid performance will directly increase on air pollution-stressed plants. We also examined settling and feeding preference of aphids for cottonwood leaves of different developmental ages. Aphids significantly preferred leaf plastochron index

5 to all other leaf ages. These data support hypotheses relating aphid leaf preference to stages of leaf development. Reproduction of the cottonwood leaf rust fungus (*Melampsora medusae* Thum.) and the imported willow leaf beetle (*Plagiodera versicolora* Laicharting) are reduced on ozone-fumigated plants (reported elsewhere). If aphid populations are affected by competition with these cottonwood pests for leaf resources, then aphid pest potential may actually increase in areas characterized by episodic ozone concentrations because of ozone-induced decreases in populations of *M. medusae* and *P. versicolora*. Environmental entomology. Apr 1988. v. 17 (2). p. 207-212. Includes references. (NAL Call No.: DNAL QL461.E532).

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ESTHAG. Deumling, D. Washington, D.C. : American Chemical Society. Environmental science & technology. July 1987. v. 21 (7). p. 612-613. Includes references. (NAL Call No.: DNAL TD420.A1E5).

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## Allelopathy: chemical interactions between plants.

ANURA. Boes, T.K. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Jan 15, 1986. v. 163 (2). p. 67-72. Includes references. (NAL Call No.: DNAL 80 AM371).

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SCIEA. Reich, P.B. Amundson, R.G. Washington, D.C. : American Association for the Advancement of Science. Science. Nov 1, 1985. v. 230 (4725). p. 566-570. Includes references. (NAL Call No.: DNAL 470 SCI2).

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## Assessing forest damage in high-elevation coniferous forests in Vermont and New Hampshire using thematic mapper data.

RSEEA. Vogelmann, J.E. Rock, B.N. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Mar 1988. v. 24. p. 227-246. ill. Includes references. (NAL Call No.: DNAL Q184.R4).



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**Bioassay indicates a metabolite of hexazinone affects phytosynthesis of loblolly pine (*Pinus taeda*).**

WEESA6. Sung, S.J.S. South, D.B.; Gjerstad, D.H. Champaign, Ill. : Weed Science Society of America. Weed science. July 1985. v. 33 (4). p. 440-442. Includes 16 references. (NAL Call No.: DNAL 79.8 W41).

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**Boron deposition on soil and native vegetation from geothermal emissions.**

JEVQAA. Land, F.J. Bingham, F.T.; Hendrix, F.F.; Crane, N.L. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. July/Sept 1986. v. 15 (3). p. 260-265. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Boron toxicity characteristics of four northern California endemic tree species.**

JEVQAA. Glaubig, B.A. Bingham, F.T. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Jan/Mar 1985. v. 14 (1). p. 72-77. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Canopy reflectance of two drought-stressed shrubs.**

PERSD. Everitt, J.H. Nixon, P.R. Falls Church, Va. : American Society of Photogrammetry and Remote Sensing. Photogrammetric engineering and remote sensing. Aug 1986. v. 52 (8). p. 1189-1192. ill. Includes references. (NAL Call No.: DNAL 325.28 P56).

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JEVQAA. Olszyk, D.M. Kats, G.; Dawson, P.J.; Bytnerowicz, A.; Wolf, J.; Thompson, C.R. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1986. v. 15 (4). p. 326-334. ill. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Charting a sustainable course.**

Brown, L.R. Wolf, E.C. New York : W.W. Norton & Company. State of the world : a Worldwatch Institute report on progress toward a sustainable society. 1987. p. 196-213. Includes references. (NAL Call No.: DNAL HC59.S73).

2517

**Clonal development of coyote willow, *Salix exigua* (Salicaceae), and attack by the shoot-galling sawfly, *Euura exiguae* (Hymenoptera: Tenthredinidae).**

EVETEX. Price, P.W. Lanham, Md. : Entomological Society of America. Five clones of the willow, *Salix exigua* Nuttall, along the Weber River, Utah, produced shorter shoots with increasing ramet age. The number of ovipositions by the shoot-galling sawfly, *Euura exiguae* Smith, correlated positively with shoot length, so that sawfly density was high on younger ramets of a clone and low on older ramets. The sawfly attacked the most vigorous parts of the clones. Survival of progeny in galls decreased with ramet age from 60% survival on 1-yr-old ramets to 26% survival on 6-yr-old ramets when plant-induced mortality was considered alone. The effects of parasitoids on the pattern of sawfly attack was not significant. Survival of progeny in young ramets (2 and 3 yr old) was higher in the egg to very early first-instar stage (50%) than in older ramets (37%) (5 and 6 yr old), but differences were slight after that stage. The major determinants of *Euura* population distribution on willow clones were the female selective oviposition behavior on longer shoots on younger ramets, which probably evolved in response to higher survival of progeny in the younger ramets. When the relative effects of attack and survival were evaluated in response to ramet age, age accounted for 89% of the variance in attack and 95% of the variance in survival. The contrast between this species and others that attack vigorous plants and plant parts and those that attack stressed plants is emphasized, and an explanation is proposed for the difference between epidemic pest insect herbivores and those that remain as endemic species. Environmental entomology. Feb 1989. v. 18. p. 61-68. Includes references. (NAL Call No.: DNAL QL461.E532).

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**A comparative evaluation of the effects of acid precipitation, natural acid production, and harvesting on cation removal from forests /Dale W. Johnson ; co-investigators, J.M. Kelly ... et al. . --.**

Johnson, D. W. Kelly, J. M. Oak Ridge, Tenn.? : Environmental Sciences Division, Oak Ridge National Laboratory?, 1985? . Cover title.~ "Task group project: F7-07."~ This research has been funded as part of the National Acid Precipitation Assessment Program by the Environmental Protection Agency under the Interagency Agreement Number 79DX0533 along with the Electr~ "DOE/OR/21400--T113."~ Publication no. 2508, Environmental Sciences. Div., ORNL.~ "DE85 O10821." 1 v. (various pagings) : ill. ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL QH545.A17J6).

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**Comparison of biomass recovery after fire of a seeder (*Ceratiola ericoides*) and a sprouter (*Quercus inopina*) species from South-central Florida.**

AMNAA. Johnson, A.F. Abrahamson, W.G.; McCrea, K.D. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Oct 1986. v. 116 (2). p. 423-428. Includes references. (NAL Call No.: DNAL 410 M58).

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**Comparison of in situ and airborne spectral measurements of the blue shift associated with forest decline.**

RSEEA. Rock, B.N. Hoshizaki, T.; Miller, J.R. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Feb 1988. v. 24 (1). p. 109-127. Includes references. (NAL Call No.: DNAL Q184.R4).

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**A comparison of the effects on Canadian boreal forest lichens of nitric and sulphuric acids as sources of rain acidity.**

NEPHA. Scott, M.G. Hutchinson, T.C.; Feth, M.J. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1989. v. 111 (4). p. 663-671. Includes references. (NAL Call No.: DNAL 450 N42).

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**Conifer tolerance and shrub response to triclopyr, 2,4-D and clopyralid.**

WSWPA. Kelpsas, B.R. White, D.E. Reno : The Society. Proceedings - Western Society of Weed Science. Paper presented at the annual meeting of the Western Society of Weed Science, March 18-20, 1986, San Diego, California. 1986. v. 39. p. 124-125. (NAL Call No.: DNAL 79.9 W52).

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**Cultivar differences in postemergence graminicide phytotoxicity to *Juniperus*.**

HUHSA. Neal, J.C. Senesac, A.F. Alexandria, Va. : American Society for Horticultural Science. HortScience. Feb 1989. v. 24 (1). p. 96-98. Includes references. (NAL Call No.: DNAL SB1.H6).

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**Cyanogenic glycosides in ant-acacias of Mexico and Central America.**

SWNAA. Seigler, D.S. Ebinger, J.E. Austin : Southwestern Association of Naturalists. The Southwestern naturalist. Dec 9, 1987. v. 32 (4). p. 499-503. Includes references. (NAL Call No.: DNAL 409.6 S08).

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**Dating earthquakes along the San Andreas Fault system in California.**

Sheppard, P.R. Jacoby, G.C. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 281-289. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**Deposition of gases and particles on vegetation and soils.**

AESTC. Chamberlain, A.C. New York, N.Y. : John Wiley & Sons. Advances in environmental science and technology. 1986. v. 18. p. 189-209. Includes references. (NAL Call No.: DNAL TD180.A3).

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**Dieback and declines of urban trees.**

JOARD. Houston, D.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Mar 1985. v. 11 (3). p. 65-72. ill. Includes references. (NAL Call No.: DNAL SB436.U6).

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**Distribution and characteristics of windthrow microtopography on the Cumberland Plateau of Kentucky.**

SSSJD4. Cremeans, D.W. Kalisz, P.J. Madison, Wis. : The Society. The abundance and characteristics of microtopography resulting from the uprooting of trees were examined on five landtypes on the northern Cumberland Plateau. Plots, 10 m by 25 m, were established at 180 locations on randomly-oriented systematic grids located in 12 first-order watersheds. The area and depth of soil disturbed were measured for each of the 524 uprootings encountered. In addition, all windthrow microtopography in a single representative hollow, 11.3 ha in area, was mapped and measured. Soil disturbance by uprooting was least on ridges, intermediate on side slopes, and greatest in coves and on lower north slopes. Percentage disturbance of the



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ground surface ranged from 0.4% on ridges to 2.4% in coves; number and mean area disturbed by individual uprootings ranged from 50 to 112 ha<sup>-1</sup>, and from 0.5 to 2.1 m<sup>2</sup> along the ridge-to-cove gradient. The lower abundance of windthrow microtopography on ridges was attributed to a relatively high incidence of stem breakage vs. uprooting. Stem breakage seemed particularly common in scarlet oak (*Quercus coccinea* Muenchh.) which dominated ridges and south slopes. Observations made during the course of this study also suggested that concentrated subsurface water flow and concomitant decreases in tree stability may contribute to uprooting in coves and on lower slopes. Windthrow, viewed as a pedogenic process, clearly does not operate uniformly over this mountainous landscape. Soil Science Society of America journal. May/June 1988. v. 52 (3). p. 816-821. maps. Includes references. (NAL Call No.: DNAL 56.9 S03).

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**Ecological changes on campsites in the Eagle Cap Wilderness, 1979 to 1984.**  
XFINA. Cole, D.N. Ogden, Utah : The Station. USDA Forest Service research note INT - United States Intermountain Forest and Range Experiment Station. July 1986. (368). 15 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764UN).

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**Economic impacts of acid rain on forest, aquatic, and agricultural ecosystems in Canada.**  
Phillips, T.P. Forster, B.A. Ames, Iowa : American Agricultural Economics Association. American journal of agricultural economics. Literature review. Dec 1987. v. 69 (5). p. 963-969. Includes references. (NAL Call No.: DNAL 280.8 J822).

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**Economic impacts of ozone and acid rain: discussion.**  
Segerson, K. Ames, Iowa : American Agricultural Economics Association. American journal of agricultural economics. Dec 1987. v. 69 (5). p. 970-971. Includes references. (NAL Call No.: DNAL 280.8 J822).

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**Effect of excess aluminum and manganese on Norway spruce seedlings as related to magnesium nutrition.**  
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**The effect of power utility rights-of-way on wetlands.**  
JOARD. Nickerson, N.H. Thibodeau, F.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Feb 1986. v. 12 (2). p. 53-55. (NAL Call No.: DNAL SB436.J6).

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**Effect of simulated acid rain on growth and yield of Valencia orange, Floradade tomato and slash pine in Florida.**  
ETOC DK. Hart, R. Biggs, R.H.; Webb, P.G. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1986. v. 5 (1). p. 79-85. Includes 21 references. (NAL Call No.: DNAL QH545.A1E58).

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**Effects of air pollutants on the composition of stable carbon isotopes, delta 13C, of leaves and wood, and on leaf injury.**  
PLPHA. Martin, B. Bytnerowicz, A.; Thorstenson, Y.R. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1988. v. 88 (1). p. 218-223. Includes references. (NAL Call No.: DNAL 450 P692).

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**Effects of forest soil acidification on ectomycorrhizal and vesicular-arbuscular mycorrhizal development.**  
NEPHA. Danielson, R.M. Visser, S. New York, N.Y. : Cambridge University Press. The New phytologist. May 1989. v. 112 (1). p. 41-47. Includes references. (NAL Call No.: DNAL 450 N42).

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**Effects of herbicide residues on germination and early survival of red oak acorns.**  
PNWSB. Shipman, R.D. Prunty, T.J. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 86-91. ill. Includes references. (NAL Call No.: DNAL 79.9 N814).

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**Effects of juglone on growth and nodulation of hairy vetch.**  
NONGA. Ponder, F. Jr. Tadros, M.G.; Tadros, S.H. Hamden, Conn. : The Association. Annual report of the Northern Nut Growers Association. 1987. (78th). p. 46-50. Includes references. (NAL Call No.: DNAL 94.69 N81).

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**Effects of simulated acid rain on cadmium mobilization in soils and subsequent uptake and accumulation in poplar and sunflower.**

JOSHB. Gingas, V.M. Sydnor, T.D.; Weidensaul, T.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1988. v. 113 (2). p. 258-261. Includes references. (NAL Call No.: DNAL 81 S012).

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**Enhanced ethylene emissions from red and Norway spruce exposed to acidic mists.**

PLPHA. Chen, Y.M. Wellburn, A.R. Rockville, Md. : American Society of Plant Physiologists. Acidic cloudwater is believed to cause needle injury and to decrease winter hardiness in conifers. During simulations of these adverse conditions, rates of ethylene emissions from and levels of 1-aminocyclopropane-1-carboxylic acid (ACC) in both red and Norway spruce needles increased as a result of treatment with acidic mists but amounts of 1-malonyl(amino)cyclopropane-1-carboxylic acid remained unchanged. However, release of significant quantities of ethylene by another mechanism independent of ACC was also detected from brown needles. Application of exogenous plant growth regulators such as auxin, kinetin, abscisic acid and gibberellic acid (each 0.1 millimolar) had no obvious effects on the rates of basal or stress ethylene production from Norway spruce needles. The kinetics of ethylene formation by acidic mist-stressed needles suggest that there is no active inhibitive mechanism in spruce to prevent stress ethylene being released once ACC has been formed. Plant physiology. Sept 1989. v. 91 (1). p. 357-361. Includes references. (NAL Call No.: DNAL 450 P692).

2542

**Ethylene production by excised sapwood of clonal eastern cottonwood and the compartmentalization and closure of seasonal wounds.**

PHYTAJ. Shain, L. Miller, J.B. St. Paul, Minn. : American Phytopathological Society. Increment cores were removed from ramets of six clones of eastern cottonwood at 3-mo intervals starting either in November, at the beginning of the dormant season, or in May, at the beginning of the growing season. By offsetting the two wounding series by 6 mo, it was possible to separate the effect of wound age from the effect of season of wounding with regard to dynamic host responses and the fungi that colonize such wounds. Production of ethylene by these cores of outer sapwood was measured 1 (et1) and 2 (et2) days after their collection and incubation in sealed containers under standardized conditions. Methane, a product of methogenic bacteria, was measured 1 day after core collection. Observations on wound closure were made at 3-mo intervals. At the time of harvest, each tree had wounds 3, 6, 9, and 12 mo old. Discoloration associated with wounds

initiated during the growing season was significantly less than that associated with wounds initiated during the dormant season regardless of wound age. Clones differed in their capacity to compartmentalize wounds. Ethylene production (et1) by increment cores collected in February correlated best with the ranking of mean clonal discoloration. The seasonal course of et1 but not et2 across clones faithfully mirrored that expected for the physiological activity of sapwood; i.e., it increased significantly through February, November, August, and May. The ratios of basal (February) to maximal (May) rates of et1 ranged from 2.7 to 5.6 for better compartmentalizing clones from 1.4 to 1.7 for poorer compartmentalizing clones. It is suggested that ratios of et1 may be used to rapidly screen for superior compartmentalizing genotypes, although additional studies are necessary to confirm or refute this hypothesis. Wounds largely closed during the 3-mo period from May to August. Clones differed significantly in their rate of closure. Those with higher et2 in May tended to close more rapidly. Wound closure and compartmentalization. h. Phytopathology. Oct 1988. v. 78 (10). p. 1261-1265. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**An evaluation of dormant oil phytotoxicity on six species of woody ornamentals.**

JOARD. Baxendale, R.W. Johnson, W.T. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1988. v. 14 (4). p. 102-105. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Freezing injury in purified plasma membranes from cold acclimated and non-acclimated needles of Pinus sylvestris: Is the plasma membrane bound ion-stimulated ATPase the primary site of freezing injury?**

Hellergren, J. Widell, S.; Lundborg, T. New York : Alan R. Liss. Plant biology. In the series analytic: Plant Cold Hardiness / edited by P.H. Li. Proceedings of an International Seminar, September 4-7, 1986, Shanghai, China. 1987. v. 5. p. 211-220. Includes references. (NAL Call No.: DNAL QH301.P535).

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**Get street-smart: protect street trees from environmental stress.**

Bassuk, N. Overland Park, Kan. : Intertec Publishing Corporation. Grounds maintenance. Jan 1988. v. 23 (1). p. 12, 14, 106, 108, 110. ill. (NAL Call No.: DNAL SB476.G7).



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**Growth and tolerance of white spruce after site preparation with liquid hexazinone.**

PNWSB. Pitt, D.G. Reynolds, P.E.; Roden, M.J. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January, 6-8, 1988, Hartford, Connecticut. 1988. v. 42 (suppl.). p. 41-47. Includes references. (NAL Call No.: DNAL 79.9 N814).

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**Growth inhibition and morphological effects of several chemicals in *Arabidopsis thaliana* (L.) Heynh.**

ETOC DK. Ratsch, H.C. Johndro, D.J.; McFarlane, J.C. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1986. v. 5 (1). p. 55-60. ill. Includes 11 references. (NAL Call No.: DNAL QH545.A1E58).

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**Growth of mycorrhizal birch in elevated levels of copper and nickel.**

Jones, M.D. Hutchinson, T.C. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 363. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

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**Herbicide tolerance in relation to growth and stress in conifers.**

WEESA6. King, S.P. Radosevich, S.R. Champaign, Ill. : Weed Science Society of America. Weed science. July 1985. v. 33 (4). p. 472-478. Includes 14 references. (NAL Call No.: DNAL 79.8 W41).

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**Horticultural oil sprays to control pests of landscape plants: an industry survey.**

JOARD. Johnson, W.T. Caldwell, D.L. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. May 1987. v. 13 (5). p. 121-125. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Hurricane salt damage.**

Witty, G. Long Island, N.Y. : Cornell Cooperative Extension Association. Long Island horticulture news. Oct 1985. p. 1-2. (NAL Call No.: DNAL SB317.5.L65).

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**An ill wind meets a windbreak.**

Brandle, J.R. Hintz, D.L. Ames, Iowa : Council for Agricultural Science and Technology. Science of food and agriculture. Nov 1987. v. 5 (4). p. 8-12. ill. Includes references. (NAL Call No.: DNAL S1.S44).

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**The impact of chronic cadmium exposure on growth of pin oak seedlings.**

FOSCA. Kazimir, J. Brennan, E. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 1061-1066. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**The impact of environmental pollution on shade trees.**

JOARD. Kozlowski, T.T. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Feb 1986. v. 12 (2). p. 29-37. ill. Includes 82 references. (NAL Call No.: DNAL SB436.J6).

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**In vitro and in vivo effects of acidity and trace elements on pollen function.**

Cox, R.M. New York : Springer-Verlag, c1986. Biotechnology and ecology of pollen : proceedings, International Conference on Biotechnology and Ecology of Pollen, 9-11 July 1985, Univ. of Massachusetts, Amherst, MA / ed. by D.L. Mulcahy, G.B. Mulcahy and E. Ottaviano. p. 95-100. ill. Includes references. (NAL Call No.: DNAL QK658.B575).

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**Influence of automobile exhaust and lead on the oxygen exchange of two lichens measured by a new oxygen electrode method.**

Lemaistre, V. New York : Plenum Press, c1985. Lichen physiology and cell biology / edited by D.H. Brown. p. 173-183. ill. Includes references. (NAL Call No.: DNAL QK581.L49).

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**The influence of weed control on establishment of loblolly pine on a Georgia piedmont pasture site.**

SWSPBE. Dougherty, P.M. Edwards, M.B. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 193-198. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Interim assessment the causes and effects of acidic deposition /Charles N. Herrick, managing editor.**

Herrick, Charles N. Washington, DC : National Acid Precipitation Assessment Program, Office of the Director of Research, 1987? . Cover title: NAPAP interim assessment.~ At head of cover title: The National Acid Precipitation Assessment Program. 4 v. : ill., maps ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL TD196.A25I64).

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**Juniper injury from Poast.**

OARCB. Smith, E.M. Treaster, S.A. Wooster, Ohio : The Center. Research circular - Ohio Agricultural Research and Development Center. Jan 1987. (291). p. 11-12. Includes references. (NAL Call No.: DNAL 100 OH3R).

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**The jury is still out: so far, no one has proven that acid rain injures forest trees.**

Erb, C. University Park, Pa. : Pennsylvania State University. PennState agriculture. Fall 1987. p. 3-11. ill. (NAL Call No.: DNAL S451.P4P45).

2561

**Lichens, tree growth, and foliar symptoms of air pollution: are the stories consistent?.**

JEVQAA. Muir, P.S. McCune, B. Madison, Wis. : American Society of Agronomy. Lichen communities, tree growth, and foliar symptoms of *Acer saccharum*, *Fraxinus* spp., *Liriodendron tulipifera*, *Quercus alba*, and the *Quercus rubra* group were studied in relation to air pollutants in southern Indiana and Illinois. Both study areas receive regional pollutants, but only one is close to a large coal-fired utility, which results in a high dose of SO<sub>2</sub> and its reaction products. Lichen communities differed significantly between the two areas; species richness and total cover were lowest in the near-utility area, and species compositional differences suggested that air quality was responsible. Few differences were noted in foliar symptoms between areas; when

symptom levels differed, they were generally highest in the remote area. Ozone-induced stippling was found in both areas on leaves of *Fraxinus* spp. and *Liriodendron*. Although ring widths indicated depressed tree growth in the near-utility area during years of high emissions, periodic basal area increments and tree vigor did not generally differ between areas, and were generally not related to foliar symptoms other than stippling. Ozone-induced stippling on *Liriodendron* was negatively correlated with basal area increments. *Journal of environmental quality*. July/Sept 1988. v. 17 (3). p. 361-370. Includes references. (NAL Call No.: DNAL QH540.J6).

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62 to 85, and 92% of the live oak, respectively. Pellets at 2 g ai placed at the base reduced the canopy 83% and killed 59% of the Macartney rose. On Texas whitebrush, 0.25, 0.5, 1, and 2 g ai tebuthiuron/tree killed from 68 to 85, 75 to 100, 90, and 100% of the plants, respectively. Tebuthiuron persisted mainly in the upper 30 cm of soil for at least 15 months. Weed science. May 1988. v. 36 (3). p. 373-378. Includes references. (NAL Call No.: DNAL 79.8 W41).

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WOOF AU. Avramidis, S. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. July 1988. v. 20 (3). p. 397-403. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Flame-retardant treatment of wood with a diisocyanate and an oligomer phosphonate.**

WOOF AU. Ellis, W.D. Rowell, R.M. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1989. v. 21 (4). p. 367-375. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Fungal colonization of preservative-treated Douglas-fir poles during storage.**

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WOODFAJ. Mitchoff, M.E. Morrell, J.J. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. July 1988. v. 20 (3). p. 370-377. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Pest management of wood-destroying organisms.**  
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WOODFAJ. Voulgaridis, E. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1988. v. 20 (1). p. 68-73. Includes references. (NAL Call No.: DNAL TA419.W6).

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WOODFAJ. DeGroot, R.C. Kuster, T.A. Madison : Society of Wood Science and Technology. Wood and fiber science. Literature review. Jan 1986. v. 18 (1). p. 58-67. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

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JWCTDJ. Ostmeyer, J.G. Elder, T.J.; Winandy, J.E. New York, N.Y. : Marcel Dekker. Journal of wood chemistry and technology. 1989. v. 9 (1). p. 105-122. Includes references. (NAL Call No.: DNAL TS932.U68).

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ANURA. Bir, R.E. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Aug 1, 1987. v. 166 (3). p. 87-92, 94-95, 98-99. (NAL Call No.: DNAL 80 AM371).

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**Treatment and durability of wooden roofing materials.**  
PAWPA. Barnes, H.M. Buchanan, B.; Amburgey, T.L. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 89-108. ill., maps. Includes references. (NAL Call No.: DNAL 300.9 AM3).



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**Trials of two powdered preservatives for phenol-formaldehyde-bonded and polymeric-isocyanate-bonded aspen structural composite board.**

FPJOA. Schmidt, E.L. Gertjeansen, R.O.  
Madison, Wis. : Forest Products Research Society. Forest products journal. Mar 1988. v. 38 (3). p. 19-21. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Use of differential scanning calorimetry for structural analysis of fungally degraded wood.**

APMBA. Reh, U. Kraepelin, G.; Lamprecht, I.  
Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. Nov 1986. v. 52 (5). p. 1101-1106. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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**Wood ties in '85--the challenge and the promise.**

PAWPA. Hinson, J.E. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 27-29. (NAL Call No.: DNAL 300.9 AM3).

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**Ambrodiscus, a new genus of inoperculate Discomycetes from ambrosia beetle galleries.**  
MYCOAE. Carpenter, S.E. Bronx, N.Y. : The New York Botanical Garden. Mycologia. May/June 1988. v. 80 (3). p. 320-323. ill. Includes references. (NAL Call No.: DNAL 450 M99).

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**Antitermitic and antifungal properties of selected bark extractives.**  
WOODFAJ. Harun, J. Labosky, P. Jr. Madison : Society of Wood Science and Technology. Wood and fiber science. July 1985. v. 17 (3). p. 327-335. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Bait stake detection of the Formosan termite in south Florida.**  
FETMA. Thompson, C.R. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1985. v. 68 (4). p. 641-645. ill. Includes references. (NAL Call No.: DNAL 420 F662).

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**Bionomics of Lomamyia hamata (Neuroptera: Berothidae).**  
AESAAI. Brushwein, J.R. College Park, Md. : The Society. Annals of the Entomological Society of America. Sept 1987. v. 80 (5). p. 671-679. ill. Includes references. (NAL Call No.: DNAL 420 EN82).

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**Boron treatment of hardwood lumber: a preliminary cost analysis.**  
FPJDA. Mulach, R.W. Cubbage, F.W.; Granskog, J.E. Madison, Wis. : Forest Products Research Society. Boron was examined as an alternative to lindane for treatment of hardwood lumber. Costs were calculated for systems representative of current practice and for systems most likely for boron usage. The application methods for current lindane-based chemicals and those required for boron differ, as do the end results. Boron treatment provides more thorough wood penetration, which results in better long-term protection of manufactured products. A comparison of costs showed boron was more expensive per unit treated than current systems with lindane, but annual costs could be reduced by selective application of boron with new bulk dip equipment. Forest products journal. July/Aug 1989. v. 39 (7/8). p. 49-52. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**A case for ecosystem-level experimentation in termite research.**  
SOCID. French, J.R.J. Chico, Calif. : California State University. Dept. of Biological Sciences. Sociobiology. Paper presented at the "Symposium on Recent Developments in Termite Biology," December 2, 1987, Boston, Massachusetts. 1988. 14 (1). p. 269-280. Includes references. (NAL Call No.: DNAL QH549.S6).

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**Comparative effects of an insect growth regulator, S-31183, against the Formosan subterranean termite and eastern subterranean termite (Isoptera: Rhinotermitidae).**  
JEENAI. Su, N.Y. Scheffrahn, R.H. Lanham, Md. : Entomological Society of America. In a no-choice experiment, the insect growth regulator 2- 1-methyl-2(4-phenoxyphenoxy) ethoxy pyridine (S-31183) induced presoldier formation more effectively in the eastern subterranean termite, Reticulitermes flavipes (Kollar) than in the Formosan subterranean termite, Coptotermes formosanus Shiraki. When given a choice of treated or untreated wood cubes, C. formosanus avoided feeding on cubes treated with concentrations of 1,500 and 7,500 ppm. A S-31183 concentration of 300 ppm (AI) did not deter feeding or increase presoldier formation in C. formosanus. Feeding of R. flavipes groups exposed to cubes containing 30 or 150 ppm S-31183 was not deterred, but these concentrations caused approximately 80% worker mortality by the end of the 12-wk test. The results indicate that S-31183 might control R. flavipes colonies if 30-150 ppm were applied to a bait. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1125-1129. Includes references. (NAL Call No.: DNAL 421 J822).

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**Comparative toxicity of fourteen insecticides to two species of carpenter ants (Hymenoptera: Formicidae).**  
JEENAI. Gibson, R.L. Scott, J.G. Lanham, Md. : Entomological Society of America. Although carpenter ants are important pests of wooden structures throughout the United States and Canada, little is known about toxicity of insecticides to these insects. We tested 14 insecticides (3 carbamates, 7 organophosphates, and 4 pyrethroids) against two species of carpenter ants, Camponotus novaeboracensis (Fitch) and C. pennsylvanicus (DeGeer), with a residual bioassay. Deltamethrin and diazinon were the most toxic to C. novaeboracensis and C. pennsylvanicus, respectively. Pyrenone and propoxur were the least toxic. A comparison of the sensitivity of carpenter ants with four other insect species, tested under identical conditions, revealed that carpenter ants were among the most sensitive. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1121-1124. Includes references. (NAL Call No.: DNAL 421 J822).



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**Comparative wood consumption within and between mounds of *Coptotermes acinaciformis* (Froggatt) (Isoptera: Rhinotermitidae).**  
SOCID. Creffield, J.W. Howick, C.D.; Pahl, P.J. Chico, Calif. : California State University, Dept. of Biological Sciences. Sociobiology. 1985. v. 11 (1). p. 77-86. Includes references. (NAL Call No.: DNAL QH549.S6).

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**Comparison of wood preservatives in stake tests (1985 progress report).**  
XALNA. Gjovik, L.R. Gutzmer, D.I. Madison : The Laboratory. USDA Forest Service research note FPL - United States, Forest Products Laboratory. Includes statistical data. May 1986. (0254). 100 p. (NAL Call No.: DNAL A99.9 F7634UN).

2663

**Concentration-dependent presoldier induction and feeding detergency: potential of two insect growth regulators for remedial control of the Formosan subterranean termite (Isoptera: Rhinotermitidae).**  
JEENAI. Haverty, M.I. Su, N.Y.; Tamashiro, M.; Yamamoto, R. Lanham, Md. : Entomological Society of America. Laboratory experimental groups of 120 workers and 30 soldiers of *Coptotermes formosanus* Shiraki were given a choice of feeding on untreated pine blocks or pine blocks treated with one of five concentrations of methoprene (0, 4, 20, 100, and 500 ppm) or S-31183 (2-1-methyl-2(4-phenoxy-phenoxy)ethoxy pyridine) (0, 20, 100, 500, and 2,500 ppm) for 4, 8, or 12 wk. Soldier production and total mortality were significantly increased by 100 and 500 ppm methoprene at 8 and 12 wk. Biologically significant mortality (>50%) resulted from feeding on blocks treated with methoprene at 500 ppm after 8 wk. The response of *C. formosanus* to S-31183 was much reduced when compared with the response to methoprene. None of the concentrations of S-31183 caused biologically significant mortality to the *C. formosanus* groups. In addition, the highest concentration of S-31183 caused feeding detergency that was apparently learned. Effective baits for remedial control of *C. formosanus* colonies should be evaluated under conditions that simulate actual use. These baits would require methoprene concentrations from 500 to 1,500 ppm, depending on the pattern of use. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1370-1374. Includes references. (NAL Call No.: DNAL 421 J822).

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**Controlling wood deterioration with fumigants: a review.**  
FPJDA. Morrell, J.J. Corden, M.E. Madison, Wis. : Forest Products Research Society. Forest products journal. Literature review. Oct 1986. v. 36 (10). p. 27-34. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Current status of the Formosan subterranean termite in Florida.**  
Su, N.Y. Scheffrahn, R.H. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii.~ Literature review. Oct 1987. (083). p. 27-31. maps. Includes references. (NAL Call No.: DNAL S481.R4).

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**Decreasing losses due to wood deterioration through proper forestry practices.**  
Amburgey, T.L. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 105-110. Includes references. (NAL Call No.: DNAL 99.9 L935).

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**Distribution and habitats of the formosan subterranean termite (Isoptera: Rhinotermitidae) in South Carolina.**  
JEENAI. Chambers, D.M. Zungoli, P.A.; Hill, H.S. Jr. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1611-1619. Includes references. (NAL Call No.: DNAL 421 J822).

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**Durability of preservative-treated wood utility poles in Guam.**  
XAFLA7. DeGroot, R.C. Lauret, T.H. Madison, Wis. : The Laboratory. Research paper FPL - United States Department of Agriculture, Forest Service, Forest Products Laboratory. May 1986. (472). 17 p. ill., maps. Includes references. (NAL Call No.: DNAL A99.9 F7634U).

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2669

**Effect of volume and position of stakes on feeding by subterranean termites (Isoptera).**  
SOCID. Shahid, A.S. Akhtar, M.S. Chico, Calif. : California State University, Department of Biological Sciences. Sociobiology. 1989. v. 16 (2). p. 99-108. ill. Includes references. (NAL Call No.: DNAL QH549.S6).

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**Effects of soldier proportion on the wood-consumption rate of the formosan subterranean termite (Isoptera: Rhinotermitidae).**  
SOCID. Su, N.Y. La Fage, J.P. Chico, Calif. : California State University, Dept. of Biological Sciences. Sociobiology. 1987. v. 13 (2). p. 145-151. Includes references. (NAL Call No.: DNAL QH549.S6).

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**Electron-dense particles in wood decayed by Ganoderma applanatum.**  
WOSTBE. Murmanis, L. Palmer, J.G.; Highley, T.L. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1985. v. 19 (4). p. 313-321. ill. Includes references. (NAL Call No.: DNAL SD433.A1W6).

2672

**Entomogenous nematodes for control of subterranean termites, Reticulitermes spp. (Isoptera: Rhinotermitidae).**  
JEENAI. Mauldin, J.K. Beal, R.H. Lanham, Md. : Entomological Society of America. Laboratory and field studies were done to determine the efficacy of entomogenous nematodes in preventing or eliminating eastern subterranean termites, Reticulitermes flavipes (Kollar), in the laboratory and infestations of Reticulitermes spp. in the field. Nematodes tested in a laboratory study were two strains (Breton and All) of Steinernema feltiae Filipjev (=Neoaplectana carpocapsae Weiser), S. bibionis (Bovien), and Heterorhabditis heliothidis (Khan, Brooks, and Hirschmann). The same nematodes were tested in field studies except that the Mexican strain of S. feltiae was used instead of the Breton strain. In the laboratory study, termites quickly moved from a nest container through a tube containing a mixture of sand, vermiculite, and water to reach a chamber in which nematodes had been released. After 9.5 wk, termite survival rates in the nematode treatments and in the untreated control did not differ significantly. In field studies, nematodes did not eliminate or control termites either in a simulation of soil treatments under concrete slabs or in logs naturally infested with termites. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1638-1642. ill. Includes references. (NAL Call No.: DNAL 421 J822).

2673

**Exposure of creosoted Douglas-fir panels in Oregon coastal waters: a preliminary report.**  
FPJDA. Lebow, S.T. Monnell, J.J. Madison, Wis. : Forest Products Research Society. Forest products journal. May 1988. v. 38 (5). p. 25-30. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

2674

**Field comparison of sulfuryl fluoride susceptibility among three termite species (Isoptera: Kalotermitidae, Rhinotermitidae) during structural fumigation.**  
JEENAI. Su, N.Y. Scheffrahn, R.H. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1986. v. 79 (4). p. 903-908. ill. Includes references. (NAL Call No.: DNAL 421 J822).

2675

**Field evaluation of responses of Gnathotrichus sulcatus and G. retusus (Coleoptera: Scolytidae) to semiochemicals.**  
JEENAI. Liu, Y.B. McLean, J.A. Lanham, Md. : Entomological Society of America. Gnathotrichus sulcatus LeConte and G. retusus LeConte of both sexes responded significantly to ethanol or their own aggregation pheromones, (+/-)-sulcatol and (+/-)-sulcatol, respectively. Ethanol was a synergist of (+)-sulcatol for both sexes of G. retusus. alpha-Pinene was neither a primary host attractant nor a synergist of the aggregation pheromones. A 1.5 mg/d release rate of (+/-)-sulcatol seems to be optimal for trapping G. sulcatus. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1687-1690. Includes references. (NAL Call No.: DNAL 421 J822).

2676

**The Formosan subterranean termite in Hawaii: problems and control.**  
Tamashiro, M. Yates, J.R.; Ebesu, R.H. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii. ~ Literature review. Oct 1987. (083). p. 15-22. maps. Includes references. (NAL Call No.: DNAL S481.R4).



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2677

**Fungal and termite resistance of wood reacted with periodic acid or sodium periodate.**

WOODFAU. Chen, G.C. Rowell, R.M. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Apr 1989. v. 21 (2). p. 163-168. Includes references. (NAL Call No.: DNAL TA419.W6).

2678

**Host selection in subterranean termites: factors affecting choice (Isoptera: Rhinotermitidae).**

SOCID. Waller, D.A. Chico, Calif. : California State University, Dept. of Biological Sciences. Sociobiology. Paper presented at the "Symposium on Recent Developments in Termite Biology," December 2, 1987, Boston, Massachusetts. 1988. 14 (1). p. 5-13. Includes references. (NAL Call No.: DNAL QH549.S6).

2679

**Influence of post-felling treatment of birch logs on emergence success of bronze birch borer, *Agrilus anxius*, adults (Coleoptera: Buprestidae).**

JESCEP. Akers, R.C. Nielsen, D.G. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Jan 1986. v. 21 (1). p. 63-67. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Influence of post-felling treatment of birch logs on emergence success of bronze birch borer, *Agrilus anxius*, adults (Coleoptera: Buprestidae).**

GENSAB. Akers, R.C. Nielsen, D.G. Tifton, Ga. : The Society. Journal of Entomological Science. Jan 1986. v. 21 (1). p. 63-67. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Insect answers: Moisture ants.**

WUEXA. Akre, R.D. Collman, S.; Antonelli, A. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Dec 1986. (1382). 4 p. ill. (NAL Call No.: DNAL 275.29 W27P).

2682

**Insects and other pests in firewood.**

Rice, M.E. Baird, C.R.; McCaffrey, J.P. Moscow, Idaho : The Service. Current information series - Cooperative Extension Service, University of Idaho. Sept 1988. (834). 3 p. ill. (NAL Call No.: DNAL 275.29 ID13IDC).

2683

**Integrated protection against lyctid beetle infestations. V. Selecting efficient schedules for pressure treatment of tropical hardwood lumber with polyborates.**

FPJDA. Barnes, H.M. Williams, L.H. Madison, Wis. : Forest Products Research Society. This research investigated pressure and nonpressure methods for treating imported hardwoods with polyborates. A series of studies was designed to determine the most efficient schedules for use with imported hardwoods. Effective treatment was obtained with both a Lowry treatment cycle and a simple vacuum process. Treatability varied depending on the species treated. Banak was much easier to treat than was obeche. Better penetration and retention were obtained with a disodium octaborate (TimBor) compared to an ammonium pentaborate/sodium sulfate solution (AmBor-S). Selective absorption from polyborate working solutions did not occur when solutions were reused for treating repetitive charges. The use of a final vacuum in the Lowry process removed approximately 5 pcf of water (about 20% moisture content) from treated stock. Forest products journal. Sept 1988. v. 38 (9). p. 13-19. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

2684

**Integrated protection against lyctid beetle infestations. II. Laboratory dip-diffusion treatment of unseasoned banak (*Virola* spp.) lumber with boron compounds.**

XFNSA. Williams, L.H. Mauldin, J.K. New Orleans, La. : The Station. U.S. Forest Service research note SO - United States, Southern Forest Experiment Station. Aug 1985. (313). 8 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7628U).

2685

**Integrated protection against lyctid beetle infestations. IV. Resistance of boron-treated wood (*Virola* spp.) to insect and fungal attack.**

FPJDA. Williams, L.H. Amburgey, T.L. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1987. v. 37 (2). p. 10-17. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

2686

**Integrated protection against lyctid beetle infestations. VI. Thermal treatment of tropical hardwood lumber with polyborates.**

FPJDA. Barnes, H.M. Williams, L.H. Madison, Wis. : Forest Products Research Society. Results are presented for air-dried banak that had been treated with a polyborate using a thermal treatment process. Results indicate that surface protection can be achieved using short immersion times. A diffusion storage period resulted in deeper, more uniform

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penetration. Forest products journal. Sept 1988. v. 38 (9). p. 20-21. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

2687

### **Introduction of *Coptotermes formosanus* Shiraki to the continental United States.**

Beal, R.H. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii.~ Literature review. Oct 1987. (083). p. 48-53. Includes references. (NAL Call No.: DNAL S481.R4).

2688

### **An overview of the Formosan subterranean termite (*Isoptera*: *Rhinotermitidae*) in the world.**

Su, N.Y. Tamashiro, M. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii.~ Literature review. Oct 1987. (083). p. 3-15. maps. Includes references. (NAL Call No.: DNAL S481.R4).

2689

### **Pest management of wood-destroying organisms.**

Moore, H.B. New York : Van Nostrand Reinhold Co., c1986. Advances in urban pest management / edited by Gary W. Bennett and John M. Owens. Literature review. p. 313-333. Includes references. (NAL Call No.: DNAL SB950.8.A3).

2690

### **Physical control of the Formosan subterranean termite, *Coptotermes formosanus* Shiraki.**

Yamano, K. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii. Oct 1987. (083). p. 43-47. ill. Includes references. (NAL Call No.: DNAL S481.R4).

2691

### **Practical considerations of the Formosan subterranean termite in Louisiana: a 30-year-old problem.**

La Fage, J.P. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii.~ Literature review. Oct 1987. (083). p. 37-42. maps. Includes references. (NAL Call No.: DNAL S481.R4).

2692

### **Preference for moist wood by the Formosan subterranean termite (*Isoptera*: *Rhinotermitidae*).**

JEENAI. Delaplane, K.S. La Fage, J.P. Lanham, Md. : Entomological Society of America. In a laboratory choice feeding test, groups of *Coptotermes formosanus* Shiraki were offered wood blocks that differed in initial moisture content. Wood-feeding rate, number of workers, and number of soldiers were highest in the high-moisture treatment. In higher-moisture blocks, damage by termites was associated with loss of block moisture, but in lower-moisture blocks, damage was associated with gain of moisture. Even though block moisture contents changed, termites determined their preferred wood blocks early, when moisture contents were more discrete, then they continued to prefer those blocks. Changes in moisture were probably the result of blocks equilibrating to ambient relative humidity of the containers, but termites enhanced this process, perhaps by actively relocating water. Our data imply that damp wood in buildings is especially vulnerable to *C. formosanus* and that bait blocks for remedial control of this pest should have high moisture content. Journal of economic entomology. Feb 1989. v. 82 (1). p. 95-100. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Preference of the Formosan subterranean termite (*Isoptera*: *Rhinotermitidae*) for wood damaged by conspecifics.**

JEENAI. Delaplane, K.S. La Fage, J.P. Lanham, Md. : Entomological Society of America. In a laboratory choice-feeding test, groups of termites from five colonies of *Coptotermes formosanus* Shiraki were presented with wood blocks that had been previously damaged by nestmates; by conspecifics from another colony; by another termite species, *Reticulitermes virginicus* (Banks); and that had no damage. *C. formosanus* preferred wood previously damaged by conspecifics, regardless of colony origin, over wood damaged by *R. virginicus* or undamaged wood. Additionally, they preferred wood damaged by *R. virginicus* over undamaged wood. Covariate analyses and trail-following assays suggested



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that the results were almost entirely explained by thigmotaxic cues on the surface of damaged wood blocks rather than on pheromonal cues deposited on the wood. *Journal of economic entomology*. Oct 1989. v. 82 (5). p. 1363-1366. Includes references. (NAL Call No.: DNAL 421 J822).

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Abstract: The topical LD50 of A-9248 (diiodomethyl para-tolyl sulfone) against the Formosan subterranean termite, *Coptotermes formosanus* Shiraki, was estimated at 141.7 ug/g with 95% fiducial limits of 110.4-168.3 ug/g. A-9248 showed protracted activity against this termite. Time required to kill 90% of *C. formosanus* (ELT90) was 8.4-18.9 d when administered topically, 21-26 d after 24-h forced feeding, and 19-22 d when *C. formosanus* were confined continuously on treated feeding substrate. Results of a choice test revealed that A-9248 is a feeding deterrent at concentrations greater than or equal to 8,000 ppm. Initially, *C. formosanus* fed on wood treated with 1,000-6,000 ppm A-9248 but learned

to avoid the treatment of A-9248. Only those groups exposed to wood treated with less than 1,000 ppm continued feeding on the treated substrate; ingestion of these concentrations resulted in 85-100% mortality at the end of the 4 wk experiment. Journal of economic entomology. June 1988. v. 81 (3). p. 850-854. Includes references. (NAL Call No.: DNAL 421 J822).

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**Comparison of site preparation methods for weed control in loblolly pine (*Pinus taeda*) plantations.**

WEESA6. Lantagne, D.O. Burger, J.A. Champaign, Ill. : Weed Science Society of America. Weed science. July 1987. v. 35 (4). p. 590-593. Includes references. (NAL Call No.: DNAL 79.8 W41).

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**Comparison of vegetation patterns resulting from bulldozing and two-way chaining on a Utah pinyon-juniper big game range.**

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**Competing vegetation affects yield of southern pines.**

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**Conditions influencing turbinella oak (*Quercus turbinella*) mortality from picloram or picloram and 2,4-D.**

WEESA6. Johnsen, T.N. Jr. Champaign, Ill. : Weed Science Society of America. Turbinella oak was sprayed with picloram-containing herbicides on 90 dates throughout 81 months. A mixture of triisopropanolamine salts of picloram and 2,4-D was compared to the potassium salt of picloram on 44 dates, and to a mixture of isooctyl ester of picloram and propylene glycol butyl ether esters of 2,4-D on 42 dates. Low rates of herbicide treatments were used to increase the sensitivity to environmental factors and plant growth stages. Turbinella oak mortality was greater with the mixture of picloram and 2,4-D amines than with picloram alone or the mixture of picloram and 2,4-D esters. The mixture of

picloram and 2,4-D esters did not kill any plants. The combination of available soil moisture at the 60-cm depth, no senescent or falling leaves, and full-sized leaves was the best indicator of when to apply picloram or the mixture of picloram and 2,4-D amines. No turbinella oak were killed when soil at the 60-cm depth was dry or leaves were falling at the time of treatment. Weed science. Nov 1988. v. 36 (6). p. 810-817. Includes references. (NAL Call No.: DNAL 79.8 W41).

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### **Control of herbaceous competitors in progeny tests.**

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### **Control of seedling deerbrush ceanothus on a forest plantation site with a paper groundcover mat compared to two soil-active herbicides.**

McHenry, W.B. Willoughby, B.L.; Anderson, D.R.; Smith, N.L.; Standiford, R. S.I. : Western Society of Weed Science. Research progress report - Western Society of Weed Science. 1987. p. 79-81. (NAL Call No.: DNAL 79.9 W52R).

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### **Control of tan oak and madrone resprouts with glyphosate plus an experimental additive.**

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XPNWA. Crawford, R.H. Carpenter, S.E.; Mayfield, J.; Martin, R.E. Portland, Or. : The Station. PNW-RN research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. July 1987. (462). 6 p. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

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Schlesinger, R.C. Van Sambeek, J.W. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. June 1986. v. 3 (2). p. 49-51. Includes references. (NAL Call No.: DNAL SD143.N6).

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SWSPB. Miller, J.H. Zhongze, Q.; Sirois, D.; Andrews, G.W. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of

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WEESA6. Newton, M. Preest, D.S. Champaign, Ill. : Weed Science Society of America. Growth of Douglas fir *Pseudotsuga menziesii* (Mirb.) Franco was increased by controlling grasses and broadleaf herbs with eight herbicide regimes during the first 3 yr after planting on a well-drained moist site in the Oregon Coast Range. The greatest growth occurred if weeds were controlled in the same growing season that tree seedlings were transplanted to the field; smaller increments came from second- and third-year weed control. Growth increases attributable to early weed control continued through the fifth year, indicating that conditions during establishment strongly influenced later growth. Plots with no herbaceous vegetation had more available soil water than those with competing vegetation, and tree seedlings on these plots experienced less water stress. Irrigation in the third year increased stem diameter of seedlings in that year but had no effect thereafter. Increases in average seedling stem volume at 5 yr after transplanting were linearly related ( $r^2 = 0.77$ ) to the difference in observed xylem potential during the first three growing seasons after transplanting and the xylem potential at which photosynthesis ceased, -2 MPa. Weed science. Sept 1988. v. 36 (5). p. 653-662. Includes references. (NAL Call No.: DNAL 79.8 W41).

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Dooling, O.J. Johnson, R.R.; Eder, R.G. Missoula, Mont. : The Region. Report - USDA Forest Service, Forest Pest Management, Northern Region. Apr 1986. (86-6). 11 p. Includes references. (NAL Call No.: DNAL aSD11.U585).

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**Growth of Douglas-fir in southwestern Oregon after removal of competing vegetation.**

XPNWA. Jaramillo, A.E. Portland, Or. : The Station. PNW-RN research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Apr 1988. (470). 12 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

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WEESA6. Cross, B.T. Wiedemann, H.T. Champaign, Ill. : Weed Science Society of America. Weed science. Mar 1985. v. 33 (2). p. 263-266. ill. Includes 7 references. (NAL Call No.: DNAL 79.8 W41).

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UTSCB. West, N.E. Van Pelt, N.S. Logan, Utah : The Station. Utah Science - Utah Agricultural Experiment Station. Summer 1989. v. 50 (2). p. 62-65. ill. (NAL Call No.: DNAL 100 UT1F).

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Mitchell, R.J. Balch, T. Auburn, Ala. : The Service. Circular ANR - Cooperative Extension Service, Auburn University. In subseries: Pest Management. May 1987. (308). 4 p. (NAL Call No.: DNAL S544.3.A2C47).

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PNWSB. Yarborough, D.E. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1985. v. 39. p. 204-206. ill. Includes 4 references. (NAL Call No.: DNAL 79.9 N814).



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**Herbaceous weed control in young pine plantations.**  
Mitchell, R.J. Lowery, R.F. Atlanta, GA : USDA Forest Service, Southern Region, 1988. A Manual on ground applications of forestry herbicides / edited by James H. Miller, Robert J. Mitchell. p. 4/1-4/8. (NAL Call No.: DNAL aSB951.4.M36).

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Mitchell, R.J. Auburn, Ala. : The Service. Circular ANR - Alabama Cooperative Extension Service, Auburn University. In subseries: Agriculture & Natural Resources. Natural Resources. Oct 1988. (1518). 4 p. (NAL Call No.: DNAL S544.3.A2C47).

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JRMGA. Sears, W.E. Britton, C.M.; Wester, D.B.; Pettit, R.D. Denver, Colo. : Society for Range Management. Journal of range management. Sept 1986. v. 39 (5). p. 399-403. Includes references. (NAL Call No.: DNAL 60.18 J82).

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JRMGA. Sears, W.E. Britton, C.M.; Wester, D.B.; Pettit, R.D. Denver, Colo. : Society for Range Management. Journal of range management. Sept 1986. v. 39 (5). p. 403-407. Includes references. (NAL Call No.: DNAL 60.18 J82).

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Miller, J.H. True, R.E. S.I. : Research Division, Georgia Forestry Commission. Georgia forest research paper. July 1986. (65). 11 p. ill. Includes references. (NAL Call No.: DNAL SD356.52.G4G4).

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 SWSPBE. Troth, J.L. Lowery, R.F.; Fallis, F.G. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. 1986. (39th). p. 297-304. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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 Darbyshire, R.L. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 68-70. Includes references. (NAL Call No.: DNAL aSD11.A42).

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 PNWSB. Ahrens, J.F. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1987. v. 41. p. 167-170. (NAL Call No.: DNAL 79.9 N814).

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 Boyd, Raymond J. Ogden, Utah : U.S. Dept. of Agriculture, Forest Service, Intermountain Research Station, 1985. Cover title.~ "December 1985."~ Chiefly tables. 66 p. : ill., forms ; 28 cm. --. Bibliography: p. 59-60. (NAL Call No.: DNAL aSD11.A48 no.195).

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**Herbicides for pine seedling release.**  
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 Alspach, L.K. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 54-57. (NAL Call No.: DNAL aSD11.A42).

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**Herbicides, the Forest Service, and NEPA.**  
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### **Hexazinone and sulfometuron methyl herbicides for pine forestry.**

SWSPB. Gonzalez, F.E. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 146-156. Includes 27 references. (NAL Call No.: DNAL 79.9 S08).

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SWSPBE. Atkins, R.L. Link, M.L. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 233-242. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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SWSPBE. Gnegy, J.D. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 155-160. (NAL Call No.: DNAL 79.9 S08 (P)).

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### **The impact of herbicides on loblolly pine plantation establishment in east Texas.**

Schoenholtz, S.H. Barber, B.L. New Orleans, La. : The Station. General technical report S0 - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 341-348. maps. Includes references. (NAL Call No.: DNAL aSD11.U57).

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### **Impact of shrub sprout competition on Douglas-fir seedling development.**

Tesch, S.D. Hobbs, S.D. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. July 1989. v. 4 (3). p. 89-92. Includes references. (NAL Call No.: DNAL SD388.W6).

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### **Improvement of oak-dominated rangeland with tebuthiuron and prescribed burning.**

TAEB. Scifres, C.J. Stuth, J.W.; Koerth, B.H. College Station, Tex. : The Station. Bulletin B - Texas Agricultural Experiment Station. Aug 1987. (1567). 24 p. Includes references. (NAL Call No.: DNAL 100 T31S (1)).

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SWSPBE. Atkins, R.L. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 262-270. maps. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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### **Influence of Ceanothus velutinus and associated forbs on the water stress and stemwood production of Douglas-fir.**

FOSCA. Petersen, T.D. Newton, M.; Zedaker, S.M. Bethesda, Md. : Society of American Foresters. Abstract: Stem dimensions for two age groups of Douglas-fir growing in the central Cascade Mountains of western Oregon were related to water-stress and the amount of interference from dense Ceanothus velutinus and forbs 8 years earlier. In 1978, three regimes were established in four 5-year-old and four 10-year-old stands by means of controls (no treatment) and two herbicide treatments to individual trees in each stand: a partial treatment (C. velutinus eliminated) and a complete treatment (both shrubs and forbs eliminated). In the subsequent year, soil water potential during late summer was less than -1.5 MPa at 10-, 40-, and 100-cm depths, where C. velutinus was growing with forbs. In the absence of shrubs and forbs, soil water potential at 100 cm was near field capacity throughout the 1979 growing season. Predawn stem water potential and Douglas-fir during late summer was significantly lower for trees competing with C. velutinus and forbs than for trees without competitors in the complete treatment, or for trees competing with forbs in the partial treatment, in the four 5-year-old stands and in two of the 10-year-old stands. By 1986, Douglas-fir stems were 2 to 6 cm larger

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in basal diameter and 1 to 2 m taller in the absence of competitors. Interference from *C. velutinus* and forbs had a greater effect on stem size of 5-year-old than 10-year-old trees. The correlation between growth and water stress suggests that interspecific competition for soil water during summer drought is a factor limiting stemwood production. FOR. SCI. 34(2):333-343. Forest science. June 1988. v. 34 (2). p. 333-343. Includes references. (NAL Call No.: DNAL 99.8 F7632).

2895

**The influence of weed control on establishment of loblolly pine on a Georgia piedmont pasture site.**

SWSPBE. Dougherty, P.M. Edwards, M.B. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 193-198. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Injected HOE-38866 for precommercial pine thinning.**

SWSPBE. Paschke, J.L. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 151-154. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Inland Empire Vegetation Management Working Group.**

Adams, D. Moscow, Idaho : The Station. Focus on renewable natural resources - University of Idaho, Forest, Wildlife and Range Experiment Station. May 1988. v. 13. p. 15-16. ill. (NAL Call No.: DNAL S916.I2F6).

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**Integrated range improvement in western juniper woodlands.**

Evans, R.A. Young, J.A. Denver, Colo. : Society for Range Management. Rangelands. Oct 1986. v. 8 (5). p. 239-240. (NAL Call No.: DNAL SF85.A1R32).

2899

**Interaction between weed control and loblolly pine, *Pinus taeda*, seedling quality.**

WETEE9. Mitchell, R.J. Zutter, B.R.; South, D.B. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr 1988. v. 2 (2). p.

191-195. Includes references. (NAL Call No.: DNAL SB610.W39).

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**Interaction of genotype and vegetation control on loblolly pine seedling performance.**

Duba, S.E. Nelson, L.R.; Gjerstad, D.H. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 305-308. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Interactions among red raspberries and northern forest trees.**

PNWSB. Lautenschlager, R.A. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1987. v. 41. p. 186-187. Includes references. (NAL Call No.: DNAL 79.9 N814).

2902

**Intermountain Region noxious weed and poisonous plant control program draft environmental impact statement /United States Department of Agriculture, Forest Service, Intermountain Region. --.**

Ogden, Utah : The Region, 1986. Cover title.~ "March 1986."~ On spine: DEIS-NW/PP control program - Intermountain Region -U.S.D.A. - F.S. 1 v. (various pagings) : ill., maps ; 28 cm. Includes bibliographies and index. (NAL Call No.: DNAL aSB617.45.A145I5).

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**Introduction to forest vegetation management.**

Walstad, J.D. Kuch, P.J. New York, N.Y. : Wiley, c1987. Forest vegetation management for conifer production / edited by John D. Walstad and Peter J. Kuch. p. 3-14. Includes references. (NAL Call No.: DNAL SB608.C7F6).



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### **Kudzu eradication trials testing fifteen herbicides.**

SWSPBE. Miller, J.H. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 276-281. (NAL Call No.: DNAL 79.9 S08 (P)).

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### **Laws and regulations pertaining to forestry herbicide contractors.**

Ezell, A. Atlanta, GA : USDA Forest Service, Southern Region, 1988. A Manual on ground applications of forestry herbicides / edited by James H. Miller, Robert J. Mitchell. p. 10/1-10/8. (NAL Call No.: DNAL aSB951.4.M36).

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### **Loblolly and shortleaf pine differ in their response when released using herbicide sprays.**

Guldin, R.W. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 287-291. Includes references. (NAL Call No.: DNAL aSD11.U57).

2908

### **Loblolly pine (Pinus taeda) response to weed control in central Louisiana.**

WETEE9. Haywood, J.D. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Oct 1988. v. 2 (4). p. 490-494. Includes references. (NAL Call No.: DNAL SB610.W39).

2909

### **Loblolly pine response to hexazinone.**

SWSPB. Karr, B.L. Janzen, G.C. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 191-196. Includes references. (NAL Call No.: DNAL 79.9 S08).

2910

### **Long-term effects on vegetation of herbicide treatments in chaparral.**

WEESA6. Holt, J.S. Radosevich, S.R.; Graves, W.L. Champaign, Ill. : Weed Science Society of America. Weed science. May 1985. v. 33 (3). p. 353-357. ill. Includes 17 references. (NAL Call No.: DNAL 79.8 W41).

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JEVQAA. Michael, J.L. Neary, D.G.; Wells, M.J.M. Madison, Wis. : American Society of Agronomy. Picloram (4-amino-3,5,6-trichloropicolinic acid) was aerially applied to a longleaf pine (*Pinus palustris* L.) site in the upper coastal plain of Alabama to control kudzu *Pueraria lobata*

(Willd.) Dcne. Pellets (10% a.i.) were spread at the rate of 56 kg ha<sup>-1</sup> on loamy sand Typic Kanhapludult soils. Movement of this herbicide was monitored with mineral soil samples, tension-cup lysimeters, flowproportional streamflow samplers, and discrete samplers. Picloram levels in the upper 15 cm of mineral soil peaked at 0.96 to 2.25 mg kg<sup>-1</sup> 25 d after application, depending on slope position, and declined to 0.13 to 0.29 mg kg<sup>-1</sup> 1 yr later. In soil solution, picloram was detected at a depth of 0.4 m between 26 and 273 d after application. Only 4 of 15 lysimeters consistently contained detectable residues. Maximum picloram levels in soil solution were 130, 450, and 191 mg m<sup>-3</sup> for ridge, midslope, and toe-slope positions, respectively. Downstream monitoring began 4 d after the herbicide application, and an initial concentration of 68 mg m<sup>-3</sup> of picloram was detected. The maximum downstream concentration of 77 mg m<sup>-3</sup> occurred 18 d after the application, immediately after the second storm event. Downstream levels dropped to less than 10 mg m<sup>-3</sup> after 90 d and to less than 2 mg m<sup>-3</sup> after 200 d. Following localized retreatment along the stream more than a year after the initial treatment, levels climbed again into the 20 to 30 mg m<sup>-3</sup> range. Most of the initial off-site movement came from a perennial stream the had been inadvertently treated, but subsequently storm runoff was the largest contributor to stream contamination. Picloram residues in this stream were similar to those observed downstream, but they were higher (up to 241 mg m<sup>-3</sup> and dropped faster to below 2 mg m<sup>-3</sup> after D 150. Journal of environmental quality. Jan/Mar 1989. v. 18 (1). p. 89-95. maps. Includes references. (NAL Call No.: DNAL QH540.J6).

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SWSPBE. Michael, J.L. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. 1986. (39th). p. 282-288. (NAL Call No.: DNAL 79.9 S08 (P)).

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SWSPBE. Voth, R.D. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 167-174. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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SJAFD. McKee, W.H. Jr. Wilhite, L.P. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1988. v. 12 (1). p. 33-36. Includes references. (NAL Call No.: DNAL SD1.S63).

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PNWSB. Schaertl, G.R. Maass, D.I.; McCormack, M.L. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January, 6-8, 1988, Hartford, Connecticut. 1988. v. 42 (suppl.). p. 68-73. Includes references. (NAL Call No.: DNAL 79.9 N814).

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# PESTICIDES - GENERAL

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WEESA6. Sung, S.J.S. South, D.B.; Gjerstad, D.H. Champaign, Ill. : Weed Science Society of America. Weed science. July 1985. v. 33 (4). p. 440-442. Includes 16 references. (NAL Call No.: DNAL 79.8 W41).

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**Biodegradation of Pentachlorophenol by the white rot fungus Phanerochaete chrysosporium.**

APMBA. Mileski, G.J. Bumpus, J.A.; Jurek, M.A.; Aust, S.D. Washington, D.C. : American Society for Microbiology. Extensive biodegradation of pentachlorophenol (PCP) by the white rot fungus Phanerochaete chrysosporium was demonstrated by the disappearance and mineralization of <sup>14</sup>C PCP in nutrient nitrogen-limited culture. Mass balance analyses demonstrated the formation of water-soluble metabolites of <sup>14</sup>C PCP during degradation. Involvement of the lignin-degrading system of this fungus was suggested by the fact that the time of onset, time course, and eventual decline in the rate of PCP mineralization were similar to those observed for <sup>14</sup>C lignin degradation. Also, a purified ligninase was shown to be able to catalyze the initial oxidation of PCP. Although biodegradation of PCP was decreased in nutrient nitrogen-sufficient (i.e., nonligninolytic) cultures of P. chrysosporium, substantial biodegradation of PCP did occur, suggesting that in addition to the lignin-degrading system, another degradation system may also be responsible for some of the PCP degradation observed. Toxicity studies showed that PCP concentrations above 4 mg/liter (15 microM) prevented growth when fungal cultures were initiated by inoculation with spores. The lethal effects of PCP could, however, be circumvented by allowing the fungus to establish a mycelial mat before adding PCP. With this procedure, the fungus was able to grow and mineralize <sup>14</sup>C PCP at concentrations as high as 500 mg/liter (1.9 mM). Applied and environmental microbiology. Dec 1988. v. 54 (12). p. 2885-2889. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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JPFCD2. Sundaram, K.M.S. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1986. v. 21 (6). p. 539-560. Includes references. (NAL Call No.: DNAL TD172.J61).

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PCBPB. Mersie, W. Singh, M. Duluth, Minn. : Academic Press. Pesticide biochemistry and physiology. May 1987. v. 28 (1). p. 114-120. Includes references. (NAL Call No.: DNAL SB951.P49).

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JEENAI. Martinat, P.J. Coffman, C.C.; Dodge, K.; Cooper, R.J.; Whitmore, R.C. Lanham, Md. : Entomological Society of America. Little is known of the effects of diflubenzuron on the nontarget forest arthropod community. We hypothesized that the use of this compound in gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), control may cause indiscriminate reduction of nontarget arthropods. This, in turn, might be an important loss of food for forest birds and small mammals. In a 2-yr replicated study we sampled canopy arthropods with pole pruners for up to 3 mo following application of diflubenzuron. Due to a strong trend over time and large between-tree variance in canopy arthropod abundance and taxonomic richness, intensive sampling was required to reveal the treatment effect. Besides reductions in gypsy moth larvae, significant reductions due to diflubenzuron application were found mainly in canopy macrolepidoptera and non-lepidopteran mandibulate herbivores. Sucking herbivorous insects, microlepidoptera, and predaceous arthropods were not affected. *Journal of economic entomology*. Feb 1988. v. 81 (1). p. 261-267. Includes references. (NAL Call No.: DNAL 421 J822).

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**Lindane and fenitrothion reduce soil and litter mesofauna on Piedmont and Appalachian sites.**  
EVETEX. Hastings, F.L. Brady, U.E.; Jones, A.S. Lanham, Md. : Entomological Society of America. Lindane applied to pines as an aqueous 0.5% spray for control of the southern pine beetle, *Dendroctonus frontalis* Zimmermann, caused long-term reductions in litter and soil mesofaunal populations in the mountains of North Carolina. Mites, collembolans, and other arthropod fauna did not return to pretreatment numbers for at least 2 yr, and soil mesofauna remained below initial populations even after 963 d. Although lindane remained in the litter and soil for about 3 yr, it did not move downslope in quantities that threatened water quality. In the Piedmont, aqueous 0.5% lindane and 2.0% fenitrothion were applied directly to the forest floor. Although initial fenitrothion residues were 7.5 times greater than those of lindane, the transient nature of these residues and reduced effects on mites and collembolans indicate it has a shorter-term effect on soil and litter fauna. Environmental entomology. Apr 1989. v. 18 (2). p. 245-250. Includes references. (NAL Call No.: DNAL QL461.E532).

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Squillace, Paul J. Engberg, R. A. Iowa City, Iowa : Dept. of the Interior, U.S. Geological Survey ; Denver, Colo. : Books and Open-File Reports distributor, 1988. vi, 81 p. : ill., maps ; 28 cm. Bibliography: p. 35-36. (NAL Call No.: DNAL GB701.W375 no.88-4060).

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**Survival of loblolly pine seedlings planted on areas fall-sprayed with soil-active herbicides.** TPLNA. McLeMORE, B.F. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Spring 1988. v. 39 (2). p. 10-12. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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**Targeted spray application and harvesting in a spruce budworm epidemic a final report of the Green Woods project** /J.B. Dimond, R.S. Seymour, D.G. Mott. --.

Dimond, John B. Seymour, R. S.; Mott, D. G. Orono, Me. : University of Maine at Orono, Maine Agricultural Experiment Station, 1985. Chiefly tables. ~ "January 1985.". 52 p. : ill., maps ; 28 cm. --. Bibliography: p. 44-45. (NAL Call No.: DNAL 100 M28M no.303).

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**Tebuthiuron formulation and placement effects on response of woody plants and soil residue.** WEESA6. Meyer, R.E. Bovey, R.W. Champaign, Ill. : Weed Science Society of America. Abstract: Tebuthiuron (N- 5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl-1-N,N'-dimethylurea in various formulations and placements was applied to honey mesquite (*Prosopis glandulosa* Torr. ~ PRCJG), huisache (*Acacia farnesiana* (L.) Willd. ~ ACAFA), live oak (*Quercus virginiana* Mill. ~ QUEVI), Macartney rose (*Rosa bracteata* J.C. Wendl. ~ ROSBC), and Texas whitebrush *Aloysia gratissima* (Gillies & Hook.) Troncoso ~ ALYLY. There was little difference in a species response to the various tebuthiuron formulations. Pellets (20%) at 2 g ai/tree base reduced the canopy 85% and killed 50% of the honey mesquite. At 1 g ai/plant, two briquettes at 0.5 g ai each or pellets (5.14 g, 20%) killed 37 and 80% of the huisache, respectively. Pellets were no more effective at 2 g than at 1 g ai on huisache. Basal treatments of 0.25, 0.5, 0.5, 1, and 2 g ai tebuthiuron/tree killed from 8 to 22, 48 to 62, 62 to 85, and 92% of the live oak, respectively. Pellets at 2 g ai placed at the

base reduced the canopy 83% and killed 59% of the Macartney rose. On Texas whitebrush, 0.25, 0.5, 1, and 2 g ai tebuthiuron/tree killed from 68 to 85, 75 to 100, 90, and 100% of the plants, respectively. Tebuthiuron persisted mainly in the upper 30 cm of soil for at least 15 months. Weed science. May 1988. v. 36 (3). p. 373-378. Includes references. (NAL Call No.: DNAL 79.8 W41).

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**Tebuthiuron persistence in the Piedmont region of Georgia.**

SWSPBE. Silvoy, J.J. Boswell, F.C.; Shuman, L.M.; Smith, A.E. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 289-296. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Thin-line treatment of red alder.**

Hibbs, D.E. Landgren, C.G. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Oct 1987. v. 2 (4). p. 130-131. Includes references. (NAL Call No.: DNAL SD388.W6).

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**Thinning red alder: effects of method and spacing.**

FOSCA. Hibbs, D.E. Emmingham, W.H.; Bondi, M.C. Bethesda, Md. : Society of American Foresters. A 14-year-old fully stocked red alder (*Alnus rubra* Bong.) stand on a site index 30 m (50 yr) site in northwest Oregon was precommercially thinned and growth measured for 5 years. Treatments were (1) 4.3 X 4.3 m in spacing (541 trees/ha), chemically thinned, (2) 6.1 X 6.1 m spacing (269 trees/ha), chemically thinned, (3) 6.1 X 6.1 m spacing, chain-saw thinned, and (4) control (1754 trees/ha). Chemical thinning was done by trunk injection of 2,4-D and caused some damage (flashback) to neighboring crop trees. Thinning increased individual-tree radial growth 49% to 100% and decreased tree height growth by as much as 56%. In combination, this resulted in no significant change in tree volume growth with thinning. The lack of tree volume growth increase combined with the decrease in stem density with thinning produced a net decrease in stand volume growth with thinning. A review of the literature showed height growth reductions to be common among other alder studies. Tree basal area growth on the chemically thinned plots did not increase as much as on the chain-saw thinned plots, suggesting a prolonged growth reduction effect from the herbicide treatment. Diameter growth decreased with increasing degree of herbicide-induced crown damage. Thinning increased the size but not the numbers of epicormic branches. The longevity or effects on wood quality of these branches is not known. Forest science. Mar 1989. v. 35 (1). p. 16-29. Includes references. (NAL Call No.: DNAL 99.8

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**Third-year growth response of loblolly pine to eight levels of competition control.**

SJAFD. Bacon, C.G. Zedaker, S.M. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1987. v. 11 (2). p. 91-95. Includes references. (NAL Call No.: DNAL SD1.S63).

3226

**Timing of disturbance after herbicide applications for chemical site preparation.**

SJAFD. Burch, P.L. Zedaker, S.M. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1988. v. 12 (2). p. 124-127. Includes references. (NAL Call No.: DNAL SD1.S63).

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United States.~Congress.~Senate.~Committee on Agriculture, Nutrition, and Forestry. Washington, D.C. : U.S. G.P.O. : For sale by the Supt. of Docs., Congressional Sales Office, U.S. G.P.O., 1986. Distributed to some depository libraries in microfiche.~ Shipping list no.: 86-650-P. v, 518 p. : ill. ; 24 cm. --. Includes bibliographical references. (NAL Call No.: DNAL KF26.A35 1986b).

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**Tordon and garlon herbicides: New applications and current use recommendations.**

SWSPB. Kline, W.N. Hern, L.K.; . Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 157-163. (NAL Call No.: DNAL 79.9 S08).

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**Tree injection for early pine seedling release in the Ozard Mountains of Arkansas.**

SJAFD. Yeiser, J.L. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Nov 1986. v. 10 (4). p. 249-251. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Triclopyr persistence in northern Idaho forest vegetation.**

BECTA6. Whisenant, S.G. McArthur, E.D. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. May 1989. v. 42 (5). p. 660-665. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

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**Understanding volatilities of forestry spray mixtures from their viscosities and viscosity-temperature relationships.**

Sundaram, A. Philadelphia, Pa. : ASTM, c1986. Pesticide formulations and application systems : fifth volume : symposium sponsored by ASTM Committee E-35 on Pesticides, Kansas City, Mo., 7-8 Nov. 1984 / L.D. Spicer and T.M. Kaneko. p. 37-55. ill. Includes references. (NAL Call No.: DNAL SB950.93.P47 1986).

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**The use of herbicides in hardwood forestry.**

Miller, J.H. Memphis, Tenn. : The Council. Proceedings ... Annual Hardwood Symposium of the Hardwood Research Council. Paper presented at the "Symposium on Applying the Latest Research to Hardwood Problems," May 10-12, 1987, Memphis, Tennessee. 1987. (15th). p. 31-52. Includes references. (NAL Call No.: DNAL SD397.H3H37).

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**Use of inventory-monitoring system for shortleaf and eastern white pine cone and seed crops at the Beech Creek Seed Orchard.**

TPLNA. Huffman, G.R. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1988. v. 39 (4). p. 23-29. Includes references. (NAL Call No.: DNAL 1.962 C5T71).



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### **Use of preemergence applied herbicides in propagation.**

Thetford, M. Gilliam, C.H.; Foster, W.U.  
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### **Vegetation management in the Coastal Plain/Piedmont final environmental impact statement : record of decision, USDA Forest Service.**

Atlanta, Ga.? : The Service, 1989 . Cover title.~ "February 27, 1989.". 1 v. (various pagings) ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL aTD194.5.V44).

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### **Vegetation management problems and solutions: Lake States.**

SWSPB. Sajdak, R.L. Kotar, J. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 327-336. Includes 14 references. (NAL Call No.: DNAL 79.9 S08).

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### **Vegetation problems and solutions: Northeast.**

SWSPB. McCormack, M.L. Jr. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 315-326. Includes 14 references. (NAL Call No.: DNAL 79.9 S08).

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**Vegetation problems and solutions: Southeast.**  
SWSPB. Gjerstad, D.H. Minogue, P.J. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 305-312. Includes references. (NAL Call No.: DNAL 79.9 S08).

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Ballew, L.E. S.l. : s.n. . Proceedings ... annual Forest Vegetation Management Conference. Meeting held November 1-2, 1984, Redding, California. Aug 1985. (6th). p. 194-201. ill. (NAL Call No.: DNAL QH541.5.F6F67).

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### **Watershed losses of triclopyr after aerial application to release spruce-fir.**

PNWSB. Smith, C.T. McCormack, M.L. Jr. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 104-108. Includes references. (NAL Call No.: DNAL 79.9 N814).

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# SOIL BIOLOGY

3244

**Clonal diversity in populations of *Polysphondylium pallidum*, a cellular slime mold.**

ECOLA. Ketcham, R.B. Eisenberg, R.M. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Oct 1989. v. 70 (5). p. 1425-1433. Includes references. (NAL Call No.: DNAL 410 EC7).

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**Comparative effects of the soil microflora on ectomycorrhizal inoculation of conifer seedlings.**

NEPHA. McAfee, B.J. Fortin, J.A. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 443-449. Includes references. (NAL Call No.: DNAL 450 N42).

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**Degradation and metabolism of mexacarbate in two types of forest litters under laboratory conditions.**

JPFCD2. Sundaram, K.M.S. Boyonoski, N.; Feng, C. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1987. v. 22 (1). p. 29-54. Includes references. (NAL Call No.: DNAL TD172.J61).

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**Effect of tebuthiuron on soil N mineralization and nitrification.**

CSOSA2. Goodroad, L.L. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Apr 1987. v. 18 (4). p. 473-481. Includes references. (NAL Call No.: DNAL S590.C63).

3248

**Entomogenous nematodes for control of subterranean termites, *Reticulitermes* spp. (Isoptera: Rhinotermitidae).**

JEENAI. Mauldin, J.K. Beal, R.H. Lanham, Md. : Entomological Society of America. Laboratory and field studies were done to determine the efficacy of entomogenous nematodes in preventing or eliminating eastern subterranean termites, *Reticulitermes flavipes* (Kollar), in the laboratory and infestations of *Reticulitermes* spp. in the field. Nematodes tested in a laboratory study were two strains (Breton and All) of *Steinernema feltiae* Filipjev (=Neosaplectana carpocapsae Weiser), *S. bibionis* (Bovien), and *Heterorhabditis heliothidis* (Khan, Brooks, and Hirschmann). The same nematodes were tested in field studies except that the Mexican strain of *S. feltiae* was used instead of the Breton strain. In the laboratory study, termites quickly moved from a

nest container through a tube containing a mixture of sand, vermiculite, and water to reach a chamber in which nematodes had been released. After 9.5 wk, termite survival rates in the nematode treatments and in the untreated control did not differ significantly. In field studies, nematodes did not eliminate or control termites either in a simulation of soil treatments under concrete slabs or in logs naturally infested with termites. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1638-1642. ill. Includes references. (NAL Call No.: DNAL 421 J822).

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**Lignin biodegradation: the microorganisms involved and the physiology and biochemistry of degradation by white-rot fungi.**

Kirk, T.K. Shimada, M. Orlando, Fla. : Academic Press. c1985. Biosynthesis and biodegradation of wood components / edited by Takayoshi Higuchi. Literature review. p. 579-605. Includes references. (NAL Call No.: DNAL TS932.B56).

3250

**Mycorrhiza and soil fertility effects with growth, nodulation and nitrogen fixation of *Leucaena* grown on a Typic Eutruxox.**

CSOSA2. Purcino, A.A.C. Lurlarp, C.; Lynd, J.Q. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May 1986. v. 17 (5). p. 473-489. ill. Includes 16 references. (NAL Call No.: DNAL S590.C63).

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**Nickel toxicity in mycorrhizal birch seedlings infected with *Lactarius rufus* or *Scleroderma flavidum*. II. Uptake of nickel, calcium, magnesium phosphorus and iron.**

NEPHA. Jones, M.D. Hutchinson, T.C. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 461-470. Includes references. (NAL Call No.: DNAL 450 N42).

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NEPHA. Jones, M.D. Hutchinson, T.C. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 451-459. Includes references. (NAL Call No.: DNAL 450 N42).



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3253

### Nitrogen isotope fractionation in burned and unburned chaparral soils.

SSSUD4. Herman, D.J. Rundel, P.W. Madison, Wis. : The Society. Plant and soil processes involving N-transformations have been monitored by techniques measuring the  $^{15}\text{N}/^{14}\text{N}$  ratio in a sample relative to the atmosphere ( $\delta^{15}\text{N}$ ). Usually low  $\delta^{15}\text{N}$  values have been reported in the tissues of chaparral shrubs. The primary objective of this study was to investigate soil N-cycling processes which may yield the low plant tissue  $\delta^{15}\text{N}$  levels. Since the chaparral is subject to periodic brush fires, which in turn result in high levels of inorganic N-forms in the soil during the first year following the burn, possible effects of burning on soil  $\delta^{15}\text{N}$  were also investigated. Incubations were conducted on soils from an area which had been subjected to a brush fire, and an adjacent unburned area; both soils are fine, thermic, schistose, very steep Ultic Haploxeralfs. Concentrations and  $\delta^{15}\text{N}$  of soil  $\text{NH}_4(1+)$  and  $\text{NO}_3(-1)$  were periodically measured. A C- and N-rich ash resulted in rapid mineralization of N in the burned soil; a substrate more resistant to biological degradation resulted in an initial loss, then subsequent slow accumulation of inorganic-N in the unburned soil. Nitrate was the dominant mineral species in each soil after a few weeks. As nitrification progressed,  $\delta^{15}\text{N}$  of  $\text{NH}_4(1+)$  increased and  $\delta^{15}\text{N}$  of  $\text{NO}_3(-1)$  decreased. Since the mineral pool in each soil became dominated by  $\text{NO}_3(-1)$   $\delta^{15}\text{N}$  of the mineral pool became strongly negative. A mathematical model of isotope dynamics fits empirical data well. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1229-1236. Includes references. (NAL Call No.: DNAL 56.9 S03).

3254

### Phenolic compound utilization by the soft rot fungus.

APMBA. Bugos, R.C. Sutherland, J.B.; Adler, J.H. Washington, D.C. : American Society for Microbiology. Nine phenolic compounds were metabolized by the soft rot fungus *Lecythophora hoffmannii* via protocatechuic acid and subsequently cleaved by protocatechuate 3,4-dioxygenase as determined by oxygen uptake, substrate depletion, and ring cleavage analysis. Catechol was metabolized by catechol 1,2-dioxygenase. Fungal utilization of these aromatic compounds may be important in the metabolism of wood decay products. Applied and environmental microbiology. July 1988. v. 54 (7). p. 1882-1885. Includes references. (NAL Call No.: DNAL 448.3 AP5).

3255

### Reexamination of pore water sulfide concentrations and redox potentials near the aerial roots of *Rhizophora mangle* and *Avicennia germinans*.

AJB0AA. McKee, K.L. Mendelssohn, I.A.; Hester, M.W. Columbus, Ohio : Botanical Society of America. American journal of botany. Sept 1988. v. 75 (9). p. 1352-1359. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

3256

### Survival and growth of outplanted pine seedlings after mycorrhizae were inhibited by use of triadimefor in the nursery.

SJAFD. Rowan, S.J. Kelley, W.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1986. v. 10 (1). p. 21-23. Includes references. (NAL Call No.: DNAL SD1.S63).

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3257

**Control of Phytophthora root and crown and trunk canker in walnut with metalaxyl and fosetyl Al.**

PLDRA. Matherson, M.E. Mircetich, S.M. St. Paul, Minn. : American Phytopathological Society. Plant disease. Dec 1985. v. 69 (12). p. 1042-1043. Includes 12 references. (NAL Call No.: DNAL 1.9 P69P).

3258

**Correlation of forest growth and yield with soil characteristics.**

XFTRA. Packee, E.C. Portland, Or. : The Station. USDA Forest Service general technical report PNW - United States, Pacific Northwest Forest and Range Experiment Station. Paper presented at the "Workshop on Alaska Forest Soil Productivity," April 28-30, 1987, Anchorage, Alaska. Apr 1988. (GTR-219). p. 37-42. Includes references. (NAL Call No.: DNAL aSD11.A46).

3259

**Effect of soil compaction and oxygen content on vertical and horizontal root distribution.**

Gilman, E.F. Leone, I.A.; Flower, F.B. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1987. v. 5 (1). p. 33-36. ill. Includes references. (NAL Call No.: DNAL SB1.J66).

3260

**Effect of soil removal and herbicide treatment on soil properties and early loblolly pine growth.**

AAEBA. Tuttle, C.L. Golden, M.S.; Meldahi, R.S. Auburn, Ala. : The Station. Bulletin - Alabama Agricultural Experiment Station. Oct 1987. (588). 22 p. Includes references. (NAL Call No.: DNAL 100 AL1S (1)).

3261

**Effects of irrigation frequency and a water-absorbing polymer amendment on ligustrum growth and moisture retention by a container medium.**

Ingram, D.L. Yeager, T.H. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1987. v. 5 (1). p. 19-21. Includes references. (NAL Call No.: DNAL SB1.J66).

3262

**Effects of soil compaction on height growth of a California ponderosa pine plantation.**

Helms, J.A. Alexander, E.B. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Oct 1986. v. 1 (4). p. 104-108. Includes references. (NAL Call No.: DNAL SD388.W6).

3263

**Effects of soil compaction on root growth characteristics of yellow-poplar and sweetgum seedlings.**

Simmons, G.L. Pope, P.E. Urbana-Champaign : Dept. of Forestry, University of Illinois. 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey D. Dawson and Kimberly A. Majerus. p. 264-268. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

3264

**Effects of soil type and compaction on the growth of Ailanthus altissima seedlings.**

Pan, E. Bassuk, N. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Dec 1985. v. 3 (4). p. 158-162. Includes 13 references. (NAL Call No.: DNAL SB1.J66).

3265

**An evaluation of physical properties droplet spectra, ground deposits and soil residues of aerially applied aminocarb and fenitrothion emulsions in conifer forests in New Brunswick.**  
JPFCD2. Sundaram, A. Sundaram, K.M.S.; Cadogan, B.L.; Nott, R.; Leung, J.W. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. Dec 1985. v. 20 (6). p. 665-688. ill. Includes references. (NAL Call No.: DNAL TD172.J61).

3266

**Herbicide conversion of a sand shinnery oak (Quercus havardii) community: effects on nitrogen.**

JRMGA. Sears, W.E. Britton, C.M.; Wester, D.B.; Pettit, R.D. Denver, Colo. : Society for Range Management. Journal of range management. Sept 1986. v. 39 (5). p. 403-407. Includes references. (NAL Call No.: DNAL 60.18 J82).



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3267

**Hexazinone residues and dissipation in soil leachates.**

JPFCD2. Feng, J.C. Sidhu, S.S.; Feng, C.C.; Servant, V. New York, N.Y. : Marcel Dekker. Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes. 1989. v. 24 (2). p. 131-143. Includes references. (NAL Call No.: DNAL TD172.J61).

3268

**Influence of formulation properties on droplet spectra and soil residues of aminocarb aerial sprays in conifer forests.**

JPFCD2. Sundaram, A. Sundaram, K.M.S.; Cadogan, B.L. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1985. v. 20 (2). p. 167-186. ill. Includes references. (NAL Call No.: DNAL TD172.J61).

3269

**The influence of homestead/grassland vegetation on soil physical, chemical and morphological properties of a Nebish soil formed under maple forest vegetation.**

PNDAAZ. Wolf, J.K. Gelderman, R.H.; Girard, M.M.; Chaput, K.G.; Woolf, M.L.; Richardson, J.L. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1985. v. 39. p. 49. Includes references. (NAL Call No.: DNAL 500 N813).

3270

**Influence of jack pine and deciduous vegetation on soil chemical and morphological properties.**

PNDAAZ. Skarie, R.L. Crane, A.M.; Fairlie, T.E.; Girard, M.M.; Hussin, M.M.; Keller, L.P.; Kulla, S.O.; Kyar, R.G.; Richardson, J.L.; Thompson, R.G. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1985. v. 39. p. 50. Includes references. (NAL Call No.: DNAL 500 N813).

3271

**Longitudinal variations in trace metal concentrations in a northern forested ecosystem.**

JEVQAA. Driscoll, C.T. Fuller, R.D.; Simone, D.M. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Jan/Mar 1988. v. 17 (1). p. 101-107. ill., maps. Includes references. (NAL Call No.: DNAL QH540.J6).

3272

**Mobility of diflubenzuron in two types of forest soils.**

JPFCD2. Sundaram, K.M.S. Nott, R. New York, N.Y. : Marcel Dekker. Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes. Literature review. 1989. v. 24 (1). p. 65-86. Includes references. (NAL Call No.: DNAL TD172.J61).

3273

**Origin, composition, and flux of dissolved organic carbon in the Hubbard Brook Valley.**

ECMOA. McDowell, W.H. Likens, G.E. Tempe, Ariz. : Ecological Society of America. Ecological monographs. Sept 1988. v. 58 (3). p. 177-195. ill., maps. Includes references. (NAL Call No.: DNAL 410 EC72).

3274

**Particle size and container size effects on growth of three ornamental species.**

JOSHB. Tilt, K.M. Bilderback, T.E.; Fonteno, W.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Nov 1987. v. 112 (6). p. 981-984. Includes references. (NAL Call No.: DNAL 81 S012).

3275

**Performance of Miconia albicans (Sw.) triana, an aluminum-accumulating species, in acidic and calcareous soils.**

CSOSA2. Haridasan, M. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May/Sept 1988. v. 19 (7/12). p. 1091-1103. Includes references. (NAL Call No.: DNAL S590.C63).

3276

**Persistence, degradation, and movement of triclopyr and its ethylene glycol butyl ether ester in a forest soil.**

JAFCAU. Lee, C.H. Oloffs, P.C.; Szeto, S.Y. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Nov/Dec 1986. v. 34 (6). p. 1075-1079. Includes references. (NAL Call No.: DNAL 381 J8223).

3277

**Picloram movement in soil solution and streamflow from a coastal plain forest.**

JEVQAA. Michael, J.L. Neary, D.G.; Wells, M.J.M. Madison, Wis. : American Society of Agronomy. Picloram (4-amino-3,5,6-trichloropicolinic acid) was aerially applied to a longleaf pine (*Pinus palustris* L.) site in the upper coastal plain

of Alabama to control kudzu *Pueraria lobata* (Willd.) Ohwi. Pellets (10% a.i.) were spread at the rate of 56 kg ha<sup>-1</sup> on loamy sand Typic Kanhapludult soils. Movement of this herbicide was monitored with mineral soil samples, tension-cup lysimeters, flowproportional streamflow samplers, and discrete samplers. Picloram levels in the upper 15 cm of mineral soil peaked at 0.96 to 2.25 mg kg<sup>-1</sup> 25 d after application, depending on slope position, and declined to 0.13 to 0.29 mg kg<sup>-1</sup> 1 yr later. In soil solution, picloram was detected at a depth of 0.4 m between 26 and 273 d after application. Only 4 of 15 lysimeters consistently contained detectable residues. Maximum picloram levels in soil solution were 130, 450, and 191 mg m<sup>-3</sup> for ridge, midslope, and toe-slope positions, respectively. Downstream monitoring began 4 d after the herbicide application, and an initial concentration of 68 mg m<sup>-3</sup> of picloram was detected. The maximum downstream concentration of 77 mg m<sup>-3</sup> occurred 18 d after the application, immediately after the second storm event. Downstream levels dropped to less than 10 mg m<sup>-3</sup> after 90 d and to less than 2 mg m<sup>-3</sup> after 200 d. Following localized retreatment along the stream more than a year after the initial treatment, levels climbed again into the 20 to 30 mg m<sup>-3</sup> range. Most of the initial off-site movement came from a perennial stream the had been inadvertently treated, but subsequently storm runoff was the largest contributor to stream contamination. Picloram residues in this stream were similar to those observed downstream, but they were higher (up to 241 mg m<sup>-3</sup> and dropped faster to below 2 mg m<sup>-3</sup> after D 150. *Journal of environmental quality*. Jan/Mar 1989. v. 18 (1). p. 89-95. maps. Includes references. (NAL Call No.: DNAL QH540.J6).

## 3278

**Pine release in unevenly stocked stands on Droughty soils may be uneconomical.**  
Guldin, R.W. New Orleans, La. : The Station. USDA Forest Service research paper SO - Southern Forest Experiment Station. Aug 1985. (216). 5 p. Includes references. (NAL Call No.: DNAL A99.9 F7628US).

## 3279

**Potential for buffering of acidic precipitation by mineral weathering in a forested entisol.**  
SSSJD4. Li, C.S. Bockheim, J.G.; Leide, J.E.; Wentz, D.A. Madison, Wis. : The Society. Bulk precipitation, soil-water, and groundwater chemistry were monitored at Round Lake, a small, forested catchment receiving acidic precipitation (pH 4.6) in northwestern Wisconsin. The groundwater basin retained H ion and released nonhydrolyzable cations (NHC = Ca, Mg, Na, K) and Si. The percentage of plagioclase feldspar, hornblende, olivine, and augite increased with depth in soils from the catchment; quartz, orthoclase feldspar, and weathered mica decreased with depth. Thermodynamic stability indices estimated from

water-quality and mineralogic data, and from the WATEQF chemical speciation model indicate that the soil-water and groundwater are undersaturated with respect to hornblende, chlorite, olivine, augite, plagioclase, and orthoclase feldspars and that these minerals may be undergoing dissolution. Minimally disturbed soil cores were leached with dilute H<sub>2</sub>SO<sub>4</sub> and distilled water (pH 3.0 to 5.7). When the pH of the extracting solution was greater than 4.5, Ca was released in the greatest amounts, followed by Si, Mg, K, Na, and Al. This ranking is similar to that for cations in groundwater. Leaching with a pH 3.0 solution released Si in the greatest amounts from the C horizon, followed by the Bw<sub>2</sub>, Bw<sub>1</sub>, and A + B/E horizons. This trend parallels the depth distribution of weatherable minerals in the very fine sand fraction. Results from the laboratory leaching study confirm the chemical modeling studies, indicating that mineral weathering (hydrolysis) can contribute to buffering within the groundwater basin at Round Lake. *Soil Science Society of America journal*. July/Aug 1988. v. 52 (4). p. 1148-1154. Includes references. (NAL Call No.: DNAL 56.9 S03).

## 3280

**Predicting tree survival and growth from minesoil analysis.**  
Davidson, W.H. Bethesda, Md. : The Society. Proceedings of the... Society of American Foresters National Convention. 1986. p. 244-246. (NAL Call No.: DNAL SD143.S64).

## 3281

**Red spruce rhizosphere dynamics: spatial distribution of aluminum and zinc in the near-root soil zone.**  
FOSCA. Smith, W.H. Pooley, A.S. Bethesda, Md. : Society of American Foresters. Red spruce roots, associated with mature, healthy trees occupying canopy positions, were located in three 8.5 m<sup>2</sup> forest floor plots at 250 m elevation in the Hubbard Brook Experimental Forest, White Mountain National Forest, New Hampshire. Roots, 0.25-1.0 cm diam, were severed, and cut ends were placed in soil in plastic bags. In 14 months, new roots developed behind cut ends and were cultured in wooden trays containing screened forest floor material. Forest floor concentrations of aluminum, calcium, chlorine, iron, lead, and zinc were established. Trays containing roots were supplied with a distilled water treatment or with distilled water containing chloride salts of aluminum, lead or zinc sufficient to increase substrate cation concentration by 500 ppm. Eight weeks following treatment, roots (largely ectomycorrhizal, diam 0.4-1.0 mm) with associated rhizosphere soil were harvested by impregnating specimens in agar and freezing in liquid nitrogen. Cross sections of root-rhizosphere soil samples were freeze dried and examined with a scanning electron microscope and energy dispersive x-ray spectrometer. Gradients of element



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concentrations were established along transects from root interiors (cortex) through the inner and outer rhizosphere zones (2 mm from root) and in bulk soil (devoid of roots). The pH of rhizosphere soil was approximately 0.5 unit less than bulk soil. Aluminum concentrations exhibited a strongly descending gradient from bulk soil through the rhizosphere to the root. Estimated concentrations ranged from 1000 ppm within 200 microns of the root to 10 x this amount in soil beyond 2000 microns. Calcium distribution, without aluminum amendment, was relatively constant through the rhizosphere, but with aluminum amendment, calcium exhibited a sharply decreasing gradient near the root. In the unamended treatment, the Al:Ca ratio dropped from 7 to 0.2 across the rhizosphere. Chlorine was constant in the rhizosphere but exhibited pronounced accumulation in. Forest science. Dec 1989. v. 35 (4). p. 1114-1124. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3282

**Relationship of aspect to soil nutrients, species importance and biomass in a forested watershed in West Virginia.**

Hicks, R.R. Jr. Frank, P.S. Jr. Asheville : The Council. Proceedings - Annual Hardwood Symposium of the Harwood Research Council. Paper presented at the "Symposium on The Changing Hardwood Scene," May 22-24, 1985, High Point, North Carolina. 1985. (13th). p. 50-60. Includes references. (NAL Call No.: DNAL SD397.H3H37).

3283

**Root growth of black walnut trees related to soil temperature, soil water potential, and leaf water potential.**

FDSCA. Khuns, M.R. Garrett, H.E.; Teskey, R.D.; Hinckley, T.M. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 617-629. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3284

**Root system considerations in the quality of loblolly pine seedlings.**

SJAfD. Carlson, W.C. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1986. v. 10 (2). p. 87-92. ill. Includes references. (NAL Call No.: DNAL SD1.S63).

3285

**Roots, air and tree health.**

Ball, J. Van Nuys, Calif. : Gold Trade Publications. Arbor age. Nov 1988. v. 8 (11). p. 12-14. ill. (NAL Call No.: DNAL SB435.5.A645).

3286

**Soil compaction: effects on seedling growth.**

Omi, S.K. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Literature review. Feb 1986. (125). p. 12-23. Includes references. (NAL Call No.: DNAL aSD11.A42).

3287

**Soil factors and efficacy of hexazinone formulations for loblolly pine (Pinus taeda) release.**

WEESA6. Minogue, P.J. Zutter, B.R.; Gjerstad, D.H. Champaign, Ill. : Weed Science Society of America. Abstract: Broadcast applications of hexazinone

3-cyclo-hexy -6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1H,3H)-dione pellets and foliar sprays were tested at four rates for hardwood control and safety to loblolly pine (Pinus taeda L.) at each of eight study locations differing in soil characteristics. Reduction in the number of hardwoods in the stand (hardwood density reduction) was greater with the pellet on soils with more than 60% sand, while the liquid formulation was most efficacious for finely textured soils. Hardwood density reduction with the pellet was negatively correlated with percent silt, clay, soil organic matter, and cation exchange capacity, and positively correlated with percent sand. With foliar sprays, hardwood density reduction was positively correlated with hexazinone rate and negatively correlated with soil pH. Pine mortality was positively correlated to percent sand with the pellet and negatively correlated to soil pH with broadcast sprays. Regression models incorporating pine height, herbicide rate, soil texture, cation exchange capacity, soil organic matter, and acidity could explain up to 78% of the variation in hardwood density change and 77% of the variation in pine mortality. Selective control of hardwoods in young loblolly pine stands is a function of hexazinone rate, formulation, and various soil factors. Weed science. May 1988. v. 36 (3). p. 399-405. Includes references. (NAL Call No.: DNAL 79.8 W41).

3288

**Soil-microsite differentiation, growth and genetic variation of lodgepole pine in the foothills of Alberta, Canada.**

CSOSA2. Florence, L.Z. Dancik, B.P. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May/Sept 1988. v. 19 (7/12). p. 1105-1116. Includes references. (NAL Call No.: DNAL S590.C63).

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3289

(NAL Call No.: DNAL 99.8 F7632).

### **Soil properties dominate yellow-poplar seedling growth.**

SJAFFD. Hay, R.L. Hammer, R.D.; Conn, J.P.  
Bethesda, Md. : Society of American Foresters.  
Southern journal of applied forestry. May 1987.  
v. 11 (2). p. 119-123. Includes references.  
(NAL Call No.: DNAL SD1.S63).

3290

### **Soil-site 1 relationships for white pine in the Northeast.**

GTRWD. Mader, D.L. Washington, D.C. : The  
Service. General technical report WO - U.S.  
Department of Agriculture, Forest Service.  
Paper presented at a "Symposium on Eastern  
White Pine: Today and Tomorrow," June 12-14,  
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28-31. Includes references. (NAL Call No.: DNAL  
aSD11.U52).

3291

### **Soils and conifer forest productivity on serpentinitized peridotite of the Trinity ophiolite, California.**

SDSCAK. Alexander, E.B. Adamson, C.; Zinke,  
P.J.; Graham, R.C. Baltimore, Md. : Williams &  
Wilkins. Soil science. Dec 1989. v. 148 (6). p.  
412-423. maps. Includes references. (NAL Call  
No.: DNAL 56.8 S03).

3292

### **Soils and productivity of lodgepole pine.**

Cochran, P.H. Pullman, Wash. : Cooperative  
Extension, Washington State University, 1985.  
Lodgepole pine--the species and its management  
: symposium proceedings, May 8-10, 1984  
Spokane, Washington, USA; repeated May 14-16,  
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comp./ed. by D.M. Baumga. p. 89-93. Includes  
references. (NAL Call No.: DNAL SD397.P585L6).

3293

### **Some responses of riparian soils to grazing management in northeastern Oregon.**

JRMGA. Bohn, C.C. Buckhouse, J.C. Denver, Colo.  
: Society for Range Management. Journal of  
range management. July 1985. v. 38 (4). p.  
378-381. maps. Includes references. (NAL Call  
No.: DNAL 60.18 J82).

3294

### **Variation in growth of red alder families in relation to shallow water table levels.**

FOSCA. Hook, D.D. Murray, M.D.; DeBell, D.S.;  
Wilson, B.C. Bethesda, Md. : Society of  
American Foresters. Forest science. Mar 1987.  
v. 33 (1). p. 224-229. Includes references.



# SOIL CLASSIFICATION AND GENESIS

3295

**Adaptation of littleleaf disease hazard rating for use in forest management in South Carolina National Forests.**

Oak, S.W. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 246-251. maps. Includes references. (NAL Call No.: DNAL aSD11.U57).

3296

**Distribution and characteristics of windthrow microtopography on the Cumberland Plateau of Kentucky.**

SSSUD4. Cremeans, D.W. Kalisz, P.J. Madison, Wis. : The Society. The abundance and characteristics of microtopography resulting from the uprooting of trees were examined on five landtypes on the northern Cumberland Plateau. Plots, 10 m by 25 m, were established at 180 locations on randomly-oriented systematic grids located in 12 first-order watersheds. The area and depth of soil disturbed were measured for each of the 524 uprootings encountered. In addition, all windthrow microtopography in a single representative hollow, 11.3 ha in area, was mapped and measured. Soil disturbance by uprooting was least on ridges, intermediate on side slopes, and greatest in coves and on lower north slopes. Percentage disturbance of the ground surface ranged from 0.4% on ridges to 2.4% in coves; number and mean area disturbed by individual uprootings ranged from 50 to 112 ha<sup>-1</sup>, and from 0.5 to 2.1 m<sup>2</sup> along the ridge-to-cove gradient. The lower abundance of windthrow microtopography on ridges was attributed to a relatively high incidence of stem breakage vs. uprooting. Stem breakage seemed particularly common in scarlet oak (*Quercus coccinea* Muenchh.) which dominated ridges and south slopes. Observations made during the course of this study also suggested that concentrated subsurface water flow and concomitant decreases in tree stability may contribute to uprooting in coves and on lower slopes. Windthrow, viewed as a pedogenic process, clearly does not operate uniformly over this mountainous landscape. Soil Science Society of America journal. May/June 1988. v. 52 (3). p. 816-821. maps. Includes references. (NAL Call No.: DNAL 56.9 S03).

3297

**Silvics of loblolly-bay, *Gordonia lasianthus*.**

Gresham, C.A. Lipscomb, D.J. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 165-169. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

3298

**Soil spot herbicides for single-stem hardwood control.**

SJAFD. Miller, J.H. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1988. v. 12 (3). p. 199-203. Includes references. (NAL Call No.: DNAL SD1.S63).

# SOIL SURVEYING AND MAPPING

3299

Potential use of soil maps to estimate southern pine beetle risk.

Lorio, P.L. Jr. Sommers, R.A. New Orleans, La.  
: The Station. Forest Service general technical  
report SO - United States, Southern Forest  
Experiment Station. Paper presented at the  
"Symposium on Integrated Pest Management," Apr  
15-18, 1985, Asheville, North Carolina. Aug  
1985. (56). p. 239-245. maps. Includes  
references. (NAL Call No.: DNAL aSD11.U57).



# SOIL FERTILITY - FERTILIZERS

3300

## Aluminum effects on northern red oak seedling growth in six forest soil horizons.

SSSUD4. Joslin, J.D. Wolfe, M.H. Madison, Wis. : The Society. The response of northern red oak (*Quercus rubra* L.) seedlings to varying levels of soil Al was examined in a 16-wk greenhouse study. Forest soil samples representing three soil series were used as growth media: Captina (Fragiudult, Missouri), Lexington (Paleudalf, Mississippi) and Becket (Fragiorthod, New York). Soil from two horizons from each series was separately amended in four treatments to create a wide range of soil Al availability: (i) control, (ii) limed  $\text{Ca}(\text{OH})_2$ , (iii) acidified (HCl), (iv) acidified with supplemental calcium added (+HCl and  $\text{CaSO}_4$ ). Treatments significantly ( $p$  less than 0.05) altered soil pH (range 3.65 to 5.48), base saturation, and 0.01 M  $\text{SrCl}_2$ -extractable Al (range 0.6-37.2 mg  $\text{kg}^{-1}$ ). Compared to controls, both acidification treatments resulted in significant reductions in fine root and foliar biomass production or in fine root branching, in all horizons except the highly organic Bhs of the Fragiorthod. In the remaining five horizons, fine root branching and biomass production were highly and negatively correlated ( $R^2 = 0.70$  and  $0.50$ , respectively) with 0.01 M  $\text{SrCl}_2$ -extractable Al. Although fine root tissue concentrations of Al correlated highly with 0.01 M  $\text{SrCl}_2$ -extractable Al levels, root tissue Al predicted root branching and biomass only moderately well ( $R^2 = 0.30$  and  $0.21$ , respectively). Fine root branching was more sensitive to treatment effects than either root biomass production or root elongation. Reductions in foliar biomass appeared to be secondary responses to direct effects on root systems. Present soil Al levels and acidic deposition rates appear to pose no threat to northern red oak in the southern portion of its range, whereas the possibility of Al toxicity in northeastern Spodosols deserves further study. Soil Science Society of America journal. Jan/Feb 1989. v. 53 (1). p. 274-281. Includes references. (NAL Call No.: DNAL 56.9 S03).

3301

## Analysis of forest fertilizer experiments: obtaining better precision and extracting more information.

FOSCA. Woollons, R.C. Whyte, A.G.D. Bethesda, Md. : Society of American Foresters. Later-age forest fertilizer experiments can be quite difficult to analyze appropriately and in ways that extract all the information inherent in the collected data. Observed responses are likely to be partially confounded with variations in pretreatment stand development, most of which can be removed through analyses of covariance using quantita of initial growing stock as a covariate. Pretreatment growth rate may represent an even more discerning covariate. Rather than use covariance some authors have chosen, instead, to use arithmetical procedures to adjust treatment responses. Reanalysis of a Canadian experiment of this latter kind suggests that such methodology may be less than ideal, and should

not be preferred to covariance analysis. A general and systematic procedure for examining forest nutrition experiments is proposed for those involving  $t$  treatments, and also those where the  $t$  treatments represent  $n$  factors at  $p$  levels in factorial combination. An example of adopting the recommendation methodology for the first type is given using a completely randomized experiment in naturally regenerated radiata pine in New Zealand with five replications of four treatments. Adoption of the suggested procedures in conjunction with two covariates provides a useful insight into the data, and appreciably increases precision. The system is sequential in structure, necessarily inducing some risk of erroneous hypothesis testing. Such a danger is usually minimal, however, and the suggested system, it is claimed, represents a useful method for isolating treatment and growth effects in forest fertilizer trials. For. Sci. 34(3):769-780. Forest science. Sept 1988. p. 769-780. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3302

## Aspen mortality following sludge application in Michigan.

Hart, J.H. Hart, J.B.; Nguyen, P.V. Seattle : University of Washington Press, 1986. The Forest alternative for treatment and utilization of municipal and industrial wastes / edited by Dale W. Cole, Charles L. Henry, and Wade L. Nutter. p. 266-271. ill. Includes references. (NAL Call No.: DNAL TD897.F65).

3303

## Black bears prefer urea-fertilized trees.

Nelson, E.E. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Jan 1989. v. 4 (1). p. 13-15. ill. Includes references. (NAL Call No.: DNAL SD388.W6).

3304

## Changes in pattern of stem growth in pole-sized loblolly pine after sewage sludge application.

McKee, W.H. Jr. New Orleans, La. : The Station. General technical report S0 - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 461-463. Includes references. (NAL Call No.: DNAL aSD11.U57).

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3305

**Comparing the effects of equal versus increasing application rates of nitrogen on the quality of shortleaf pine seedlings.**

Brissette, J.C. Tiarks, A.E.; Carlson, W.C. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 95-100. Includes references. (NAL Call No.: DNAL aSD11.U57).

3306

**Controlling the bronze birch borer.**

Schuder, D.L. West Lafayette : The Service. Publication E - Purdue University, Cooperative Extension Service. In subseries: Ornamental Insects. Oct 1986. (50,rev.). 2 p. ill. (NAL Call No.: DNAL SB844.I6P8).

3307

**Crown release and fertilization of natural black walnut.**

Ponder, F. Jr. Schlesinger, R.C. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Dec 1986. v. 3 (4). p. 153-155. Includes references. (NAL Call No.: DNAL SD143.N6).

3308

**Cupric carbonate controls green ash root morphology and root growth.**

HJHSA. Arnold, M.A. Struve, D.K. Alexandria, Va. : American Society for Horticultural Science. HortScience. Apr 1989. v. 24 (2). p. 262-264. Includes references. (NAL Call No.: DNAL SB1.H6).

3309

**Effect of family and nitrogen fertilizer on growth and foliar nutrients of Douglas-fir saplings.**

FOSCA. DeBell, D.S. Silen, R.R.; Radwan, M.A.; Mandel, N.L. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1986. v. 32 (3). p. 643-652. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3310

**Effect of inoculum density and fertilization on greenhouse screening of loblolly pine seedlings for resistance to fusiform rust.**

PHYTAJ. Carson, S.D. Young, C.H. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Aug 1987. v. 77 (8). p. 1186-1191. Includes references. (NAL Call No.:

DNAL 464.8 P56).

3311

**Effect of operational fertilization on foliar nutrient content and growth of young Douglas-fir and Pacific silver fir.**

XPNWA. Cochran, P.H. Lopushinsky, W.; McColley, P.D. Portland, Or. : The Station. PNW research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. July 1986. (445). 10 p. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

3312

**Effect of slow release fertilizers on formation of mycorrhizae and growth of container grown pine seedlings.**

Crowley, D.E. Maronek, D.M.; Hendrix, J.W. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1986. v. 4 (3). p. 97-101. Includes 11 references. (NAL Call No.: DNAL SB1.J66).

3313

**Effect of sludge on wood properties: a conceptual review with results from a sixty-year-old Douglas-fir stand.**

Briggs, D.G. Mecific, F.; Smith, W.R. Seattle : University of Washington Press, 1986. The Forest alternative for treatment and utilization of municipal and industrial wastes / edited by Dale W. Cole, Charles L. Henry, and Wade L. Nutter. p. 246-257. Includes references. (NAL Call No.: DNAL TD897.F65).

3314

**Effects and interactions of slash burning and mycorrhizal infection on douglas-fir seedling growth and morphology.**

Black, C.H. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 276. (NAL Call No.: DNAL aQK604.N6 1984).

3315

**Effects of different urea fertilizers on soil and trees in a young thinned stand of western hemlock.**

SSSJD4. Radwan, M.A. DeBell, D.S. Madison, Wis. : The Society. Effects of three different urea fertilizers on selected chemical characteristics of soils and foliage, and on growth per tree of a 24-yr-old thinned stand of



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western hemlock *Tsuga heterophylla* (Raf.) Sarg. were compared at a site in coastal Oregon. Treatments were the following: untreated control (C), urea (U), urea treated with N-Serve nitrapyrin, 2-chloro-6-(trichloromethyl) pyridine (U + NS), and sulfur-coated urea (SCU). Fertilizers were uniformly applied by hand to 0.03-ha plots in March at 224 kg N ha<sup>-1</sup>. Soil, to a depth of 20 cm, and current-year foliage were sampled periodically for 2 yr. Height and diameter of 10 dominant or codominant trees per plot were measured annually for 6 yr. Treatment effects on soil pH varied by fertilizer and sampling date; throughout, pH was lower with U + NS than with U, and the smallest change in pH was associated with SCU. Effects of fertilizer on inorganic N in the soil and on foliar nutrients varied by fertilizer and sampling date. Initially, N-Serve inhibited nitrification and produced the highest NH<sub>4</sub>-N concentrations. In general, all fertilizers increased inorganic N in the soil and total N in the foliage. Fertilizers significantly reduced foliar concentrations of some other macronutrients, especially in the first year after fertilization; some depressions were significantly less with SCU than with the other two fertilizers. Height growth per tree was not significantly affected by any of the fertilizers. Basal-area and volume growth per tree were significantly greater with the SCU treatment than with the control, U, or U + NS treatments. Beneficial effects of SCU seemed to be mostly due to the slow release of N from the fertilizer, although some positive effect of S cannot be ruled out. *Soil Science Society of America journal*. May/June 1989. v. 53 (3). p. 941-946. Includes references. (NAL Call No.: DNAL 56.9 S03).

3316

### Effects of fertilization on growth and foliar nutrients of red alder seedlings.

XFPNA. Radwan, M.A. Portland, Or. : The Station. USDA Forest Service research paper PNW-RP - United States, Pacific Northwest Research Station. July 1987. (375). 14 p. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

3317

### Effects of propagation container dimensions, and media on the growth of 4 nursery crops.

Threadgill, C.C. Whitcomb, C.E.; McNew, R. Washington, D.C. : Horticultural Research Institute. *Journal of environmental horticulture*. Sept 1985. v. 3 (3). p. 126-131. Includes 12 references. (NAL Call No.: DNAL SB1.J66).

3318

### Enhanced herbaceous weed control in conifers with combinations of nitrogen fertilizer formulations and hexazinone.

WSWPA. White, D.E. Newton, M.; Cole, E.C. Reno : The Society. *Proceedings - Western Society of Weed Science*. Paper presented at the annual meeting of the Western Society of Weed Science, March 18-20, 1986, San Diego, California. 1986. v. 39. p. 102-106. (NAL Call No.: DNAL 79.9 W52).

3319

### Estimating the response of ponderosa pine forests to fertilization.

XGTIA. Powers, R.F. Webster, S.R.; Cochran, P.H. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 219-225. maps. Includes references. (NAL Call No.: DNAL aSD11.A48).

3320

### Explorations of mechanisms regulating ectomycorrhizal colonization of boron-fertilized pine quarterly report, period covered 8/20/86-3/31/87 /principal investigator, Harold E. Garrett.

Garrett, Harold E. Columbia, Mo. : University of Missouri? , 1987. "Submitted to Department of Energy." ~ "DOE/CE/15270--T1." ~ "DE87 006451." ~ "Instrument no. DE-FG01-86CE1570." 17 p. : ill. ; 28 cm. (NAL Call No.: DNAL QK918.G3).

3321

### Factors regulating overwinter survival of newly propagated stem tip cuttings of *Acer palmatum* Thunb. 'Bloodgood' and *Cornus florida* L. var. *rubra*.

HJHSA. Goodman, M.A. Stimart, D.P. Alexandria, Va. : American Society for Horticultural Science. *HortScience*. Dec 1987. v. 22 (6). p. 1296-1298. Includes references. (NAL Call No.: DNAL SB1.H6).

3322

### Fertilization and competition control accelerate early southern pine growth on flatwoods.

SJAFD. Swindel, B.F. Neary, D.G.; Comerford, N.B.; Rockwood, D.L.; Blakeslee, G.M. Bethesda, Md. : Society of American Foresters. *Southern journal of applied forestry*. May 1988. v. 12 (2). p. 116-121. ill. Includes references. (NAL Call No.: DNAL SD1.S63).

3323

**Fertilizer trials on containerized red pine.**  
Eggleston, K.L. Sharp, R.C. Fort Collins, Colo.  
: The Station. General technical report RM -  
Rocky Mountain Forest and Range Experiment  
Station, United States, Forest Service. Feb  
1986. (125). p. 38-42. maps. Includes  
references. (NAL Call No.: DNAL aSD11.A42).

3324

**Field performance of five interior spruce stock types with and without fertilization at time of planting.**

Sutherland, C. Newsome, T. Fort Collins, Colo.  
: The Station. General technical report RM -  
Rocky Mountain Forest and Range Experiment  
Station, U.S. Department of Agriculture, Forest  
Service. Paper presented at a meeting of the  
Western Forest Nursery Associations, Aug 8-11,  
1988, Vernon, British Columbia. Dec 1988.  
(167). p. 195-198. Includes references. (NAL  
Call No.: DNAL aSD11.A42).

3325

**Growth and heavy metal accumulation in pine seedlings grown with sewage sludge.**

JEVQAA. Berry, C.R. Madison, Wis. : American  
Society of Agronomy. Journal of environmental  
quality. July/Sept 1985. v. 14 (3). p. 415-419.  
Includes references. (NAL Call No.: DNAL  
QH540.J6).

3326

**Growth of nitrogen-fertilized and thinned quaking Aspen (*Populus tremuloides* Michx.).**

Perala, D.A. Laidly, P.R. St. Paul, Minn. : The  
Station. Research paper NC - U.S. Department of  
Agriculture, Forest Service, North Central  
Forest Experiment Station. 1989. (286). 8 p.  
Includes references. (NAL Call No.: DNAL  
aSD11.A34).

3327

**Growth rates after fertilizing lodgepole pine.**

Cochran, P.H. Bethesda, Md. : Society of  
American Foresters. Western journal of applied  
forestry. Jan 1989. v. 4 (1). p. 18-20.  
Includes references. (NAL Call No.: DNAL  
SD388.W6).

3328

**Growth response of a boreal black spruce stand to fertilizer treatments.**

Foster, N.W. Morrison, I.K.; Swan, H.S.D.  
Bethesda, Md. : Society of American Foresters.  
Northern journal of applied forestry. Dec 1986.  
v. 3 (4). p. 142-144. Includes references. (NAL  
Call No.: DNAL SD143.N6).

3329

**Growth, xylem pressure potential, and nutrient absorption of loblolly pine on a reclaimed surface mine as affected by an induced *Pisolithus tinctorius* infection.**

FOSCA. Walker, R.F. West, D.C.; McLaughlin,  
S.B.; Amundsen, C.C. Bethesda, Md. : Society of  
American Foresters. The effects of *Pisolithus*  
*tinctorius* ectomycorrhizae on survival, growth,  
xylem pressure potential, and nutrient uptake  
of loblolly pine on a southern Appalachian coal  
surface mine were examined. One-year-old  
bareroot seedlings artificially inoculated with  
*P. tinctorius* and control seedlings with  
*Thelephora terrestris* ectomycorrhizae were  
outplanted on a surface-mined site in  
Tennessee. The site had previously been  
contoured and hydroseeded with a mixture of  
herbaceous ground cover species. A soil  
fertility variable was imposed in the study by  
broadcast fertilization at outplanting of  
one-half of the plots of each mycorrhizal  
treatment at the rate of 336 kg/ha NPK. After 7  
years, survival and growth of trees previously  
inoculated with *P. tinctorius* were  
significantly improved relative to control  
trees. Fertilization elicited a significant  
reduction in survival and a negligible growth  
response in trees of both mycorrhizal  
treatments due primarily to its stimulation of  
competing herbaceous species. During the third  
growing season, xylem pressure potential of  
seedlings with *P. tinctorius* ectomycorrhizae  
was significantly less negative than that of  
control seedlings during a prolonged period of  
moisture stress. Analyses of foliar samples  
collected during the third growing season  
revealed that seedlings infected by *P.*  
*tinctorius* had more NO<sub>3</sub> and less Zn in their  
needles than control seedlings. The results of  
this study provide evidence that the benefits  
afforded loblolly pine on surface mines by *P.*  
*tinctorius* ectomycorrhizae include enhanced  
absorption of water as well as increased uptake  
of nutrients, and these benefits are not  
compromised by the presence of competing  
herbaceous species. Forest science. June 1989.  
v. 35 (2). p. 569-581. Includes references.  
(NAL Call No.: DNAL 99.8 F7632).

3330

**Heating system, germination temperature and post germination fertilizer regime effects on white spruce nursery growth.**

Hawkins, C.D.B. Draper, D.A.; Eng, R.Y.N. Fort  
Collins, Colo. : The Station. General technical  
report RM - Rocky Mountain Forest and Range  
Experiment Station, U.S. Department of  
Agriculture, Forest Service. Paper presented at  
a meeting of the Western Forest Nursery  
Associations, Aug 8-11, 1988, Vernon, British  
Columbia. Dec 1988. (167). p. 50-53. (NAL Call  
No.: DNAL aSD11.A42).



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3331

**Height and diameter growth response in loblolly pine stands following fertilization.**  
FOSCA. Bolstad, P.V. Allen, H.L. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1987. v. 33 (3). p. 644-653. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3332

**Influence of fall fertilization and moisture stress on growth and field performance of container-grown Douglas-fir seedlings.**  
XGTIA. Jopson, T.M. Paul, J.L. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. June 1985. (185). p. 14-19. ill. Includes references. (NAL Call No.: DNAL aSD11.A48).

3333

**Leaf area, stemwood growth, and nutrition relationships in loblolly pine.**  
FOSCA. Vose, J.M. Allen, H.L. Bethesda, Md. : Society of American Foresters. The relationships among loblolly pine (*Pinus taeda* L.) stand leaf area index (LAI), stemwood volume growth (m<sup>3</sup>/ha/yr), and growth efficiency (m<sup>3</sup> stemwood/ha/yr/LAI) were examined in three nitrogen (N) by phosphorus (P) fertilization field trials. Prior to fertilization, stocking levels and nitrogen limitations varied for the three stands. LAI increased significantly (up to 60%) following N fertilization on the two N deficient stands. Phosphorus additions did not affect LAI. Stemwood growth was positively and linearly related to LAI across treatments and stands. Variations in LAI across stands reflected the differences in stocking and N availability. On average, a unit of LAI produced 7.3 m<sup>3</sup> stemwood/ha/yr. Growth efficiency was not affected by fertilization on two of the three stands. A decrease in growth efficiency at a projected LAI above 3.5 resulted from an asymptotic relationship between stemwood growth and LAI on a stand that was fully stocked and highly responsive to N fertilization. The use of LAI as an index of stocking is proposed because LAI integrates tree size, stand density, and site resource supply. In addition, it is proposed that the deviation of a stand's current LAI from the maximum supportable LAI based on fixed site factors (e.g., water, temperature) may provide a good measure of a stand's potential responsiveness to fertilization. For. Sci. 34(3):547-563. Forest science. Sept 1988. p. 547-563. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3334

**Long-term effects of fertilization on stem form, growth relations, and yield estimates of slash pine.**  
FOSCA. Jokela, E.J. Harding, R.B.; Nowak, C.A. Bethesda, Md. : Society of American Foresters. The long-term effects of time-of-planting phosphorus (P) fertilization on stem form were evaluated in a 25-year-old slash pine plantation in north Florida. Cylindrical form factor (CFF), relative taper curves, the constant-stress principle of stem formation, and individual tree volume and biomass estimation equations were compared among treatments. Significant differences in CFF and taper existed between control and fertilized trees. Treatment-induced changes in crown size and accelerated tree and stand development may be responsible for these differences. Although statistically significant, alteration of stem form by fertilization was of minor importance relative to the accurate estimation of stand volume and weight. The cost and effort necessary to develop treatment-specific equations for quantifying fertilizer responses for slash pine on P-deficient sites appears unwarranted. Forest science. Sept 1989. v. 35 (3). p. 832-842. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3335

**Mycorrhiza and soil fertility effects with growth, nodulation and nitrogen fixation of *Leucaena* grown on a Typic Eutruxox.**  
CSOSA2. Purcino, A.A.C. Lurlarp, C.; Lynd, J.Q. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May 1986. v. 17 (5). p. 473-489. ill. Includes 16 references. (NAL Call No.: DNAL S590.C63).

3336

**Nitrogen sources and fertilizer rates affect growth of hybrid poplar.**  
Hansen, E.A. Tolsted, D.N. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey D. Dawson and Kimberly A. Majerus. p. 71-77. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

3337

**Nursery and field evaluation of compost-grown coniferous seedlings.**  
Coleman, M. Dunlap, J.; Dutton, D.; Bledsoe, C. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater,

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Washington, Dec 1986. (137). p. 24-28. Includes references. (NAL Call No.: DNAL aSD11.A42).

3338

### Patterns of leaf area distribution within crowns of nitrogen- and phosphorus-fertilized loblolly pine trees.

FOSCA. Vose, J.M. Bethesda, Md. : Society of American Foresters. Field trials of nitrogen (N) and phosphorus (P) fertilization in loblolly pine plantations (*Pinus taeda* L.) were used to determine the effects of fertilization on within-crown leaf area distribution in a fully stocked stand, and two less than fully stocked stands. A second objective was to examine the utility of the Weibull distribution for modeling leaf area distribution in loblolly pine crowns. Results showed that leaf area increases were most evident in the mid- and lower-crown positions (2-4 m and 4-6 m crown depths), regardless of stocking level. Response patterns suggested that the Westvaco Stocking Chart, which is based on empirical relationships between stand basal area, stand density, and canopy closure, did not adequately reflect light interception in these stands because stands were ranked differently when stocking was expressed by stand leaf area index. The fully stocked stand was 50% below the theoretical optimum leaf area index value of 5. Thus, it is hypothesized that leaf area increases occurred in the mid- and lower-crown positions because shading in the mid- and lower-crown positions was insufficient to inhibit foliage production and survival. Fertilization-induced changes in leaf physiology may have also played an important role in leaf production and branch retention in the mid- and lower-crown. The Weibull distribution provided a good fit of within-crown leaf area distribution. *For. Sci.* 34(3): 564-573. *Forest science*. Sept 1988. p. 564-573. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3339

### Physiological characteristics of loblolly pine seedlings in relation to field performance.

Kramer, P.J. Rose, R.W. Jr. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 416-440. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

3340

### Plant uptake of trace elements from coal gasification ashes.

JEVQAA. Francis, C.W. Davis, E.C.; Goyert, J.C. Madison, Wis. : American Society of Agronomy. *Journal of environmental quality*. Oct/Dec 1985. v. 14 (4). p. 561-569. Includes references. (NAL Call No.: DNAL QH540.J6).

3341

### Predicting fertilizer response of loblolly pine using foliar and needle-fall nutrients sampled in different seasons.

FOSCA. McNeil, R.C. Lea, R.; Ballard, R.; Allen, H.L. Bethesda, Md. : Society of American Foresters. Nitrogen (N) phosphorus (P) concentrations in loblolly pine (*Pinus taeda*) foliage and needle-fall were determined five times during 1979 on ten fertilizer trails installed between 1971 and 1973. Bole volume responses to fertilizers were regressed on initial stand basal area, and the residual errors were used as dependent variables in regressions with the nutrient variables. The only sampling period during which the N response residuals had a significant relation to foliar nutrients was early fall. The needle-fall N/P ratio was significantly related to the N response residuals in late winter, late spring, and early fall. Phosphorus response residuals were significantly related to foliar nutrients during all sampling periods and to needle-fall N/P in all sampling periods except late winter. The maximum  $R^2$ , 0.73, was for the regression of the P response residuals versus a foliar N/P ratio in late spring. The N + P response residuals were not significantly related to foliar or needle-fall nutrients. *For. Sci.* 34(3):698-707. *Forest science*. Sept 1988. p. 698-707. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3342

Proceedings Intermountain Nurseryman's Association meeting : August 13-15, 1985, Fort Collins, Colorado /technical coordinators: Thomas D. Landis, James W. Fischer. --. Intermountain Nurseryman's Association. ~Meeting\_ (1985 : Fort Collins, Colo.). Landis, Thomas D.; Fischer, James W. Fort Collins, Colo. : Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Dept. of Agriculture, 1986. "February 1986.". 111 p. : ill., 1 map ; 28 cm. --. Includes bibliographies. (NAL Call No.: DNAL aSD11.A42 no.125).

3343

### Recent research indicates plant community responses to intensive treatment including chemical amendments.

SJAFD. Swindel, B.F. Smith, J.E.; Neary, D.G.; Comerford, N.B. Bethesda, Md. : Society of American Foresters. *Southern journal of applied forestry*. Aug 1989. v. 13 (3). p. 152-156. Includes references. (NAL Call No.: DNAL SD1.S63).



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3344

**Relationship of feeding damage by red squirrels to cultural treatments in young stands of lodgepole pine.**

XGTIA. Brockley, R.P. Sullivan, T.P. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 322-329. Includes references. (NAL Call No.: DNAL aSD11.A48).

3345

**Response of longleaf pine to varying intensity of silvicultural treatments.**

Loveless, R.W. Pait, J.A. III; McElwain, T. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 159-164. maps. Includes references. (NAL Call No.: DNAL aSD11.U57).

3346

**Root and foliar nutrient concentrations in loblolly pine: effects of season, site, and fertilization.**

FOSCA. Adams, M.B. Campbell, R.G.; Allen, H.L.; Davey, C.B. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1987. v. 33 (4). p. 984-996. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3347

**Weed control and fertilization aid sweetgum plantation establishment.**

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**Xanthoteras sp. (Hymenoptera: Cynipidae) gall abundance on shinnery oak (*Quercus havardii*) in New Mexico: an indicator of plant stress?.**

SWNAA. Dodson, G. Austin : Southwestern Association of Naturalists. The Southwestern naturalist. Dec 9, 1987. v. 32 (4). p. 463-468. ill., maps. Includes references. (NAL Call No.: DNAL 409.6 S08).

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**Companion planting of black walnut with autumn olive to control Mycosphaerella leaf spot of walnut.**

Kessler, K.J. Jr. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 285-288. ill. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

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**Growth, yield, and value projections for black walnut interplantings with black alder and autumn olive.**

Campbell, G.E. Dawson, J.D. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Sept 1989. v. 6 (3). p. 129-132. Includes references. (NAL Call No.: DNAL SD143.N6).

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**Mechanical shrub control on flatwoods range in south Florida.**

JRMGA. Tanner, G.W. Wood, J.M.; Kalmbacher, R.S.; Martin, F.G. Denver, Colo. : Society for Range Management. Journal of range management. May 1988. v. 41 (3). p. 245-248. Includes references. (NAL Call No.: DNAL 60.18 J82).

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**Mulches and herbicides in ornamental plantings.**

HJHSA. Robinson, D.W. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Woody Plants in the Urban Environment: Selection and Management of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 15, 1986, Davis, California.~ Literature review. June 1988. v. 23 (3). p. 547-552. Includes references. (NAL Call No.: DNAL SB1.H6).

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**Physical properties of pine bark and hardwood bark media and their effects with 4 fertilizers on growth of Ilex X 'Nellie R. Stevens' holly.**

Bilderback, T.E. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Dec 1985. v. 3 (4). p. 181-185. Includes 13 references. (NAL Call No.: DNAL SB1.J66).

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**Plant-water relationships and growth of black walnut in a walnut-forage multicropping regime.**

FOSCA. Dey, D. Conway, M.R.; Garrett, H.E.; Hinckley, T.S.; Cox, G.S. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1987. v. 33 (1). p. 70-80. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Tebuthiuron persistence in the Piedmont region of Georgia.**

SWSPBE. Silvoy, J.J. Boswell, F.C.; Shuman, L.M.; Smith, A.E. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 289-296. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Tree crops--the way out.**

Smith, J.R. Emmaus, Pa. : Regenerative Agriculture Association. The New farm. July/Aug 1988. v. 10 (5). p. 40-43. ill. (NAL Call No.: DNAL S1.N32).

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**Use of biological control measures in the intensive management of insect pests in New Jersey.**

Lashomb, J.H. Metterhouse, W.; Chianese, R. Greenbelt, Md. : Institute for Alternative Agriculture. The U.S. public is expressing strong preference for the use of biological control methods in the management of U.S. agricultural, forest and rangeland insect pests. This follows from a widespread understanding among citizens that synthetic insecticides have potentially harmful side effects on humans and that they are spreading increasingly as pollutants in the environment. Major recent increases in the number of pesticide-resistant insect species also put pressure on the agricultural community toward adoption of alternative non-agchemical plant and animal protection strategies. Movement in the direction of such alternatives has been facilitated by the fact that in the last two decades much progress has been made in Integrated Pest Management (IPM) through an improved understanding of the interactions of pests with their hosts. In that time period, many advances have been made in describing and predicting insect movement, seasonal cycles, and the effects of secondary plant compounds on insect reproduction. Simultaneously, much has been learned about the behavior, physiology, and population dynamics of insect parasitoids, i.e. parasites on insect pests. In the 1990's and subsequently, Biological Control Intensive Pest Management (BCIPM) will require continuing research to attain needed advancement in knowledge of growth and development of host plants, population dynamics of pests and parasitoids, and ecology of secondary pests



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that may interfere with implementation of BCIPM programs. Extension and research personnel will then be increasingly able to devise useful control methods for pests within selected cropping systems. We describe here examples to illustrate present and potential future use of BCIPM in different practical plant systems in New Jersey. American journal of alternative agriculture. Paper presented at the "Symposium on Biological Pest Control", Mar 1, 1988, Washington, DC.~ Literature review. Spring/Summer 1988. v. 3 (2/3). p. 77-82. Includes references. (NAL Call No.: DNAL S605.5.A43).

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3358

**Boundary form effects on woody colonization of reclaimed surface mines.**

ECOLA. Hardt, R.A. Forman, R.T.T. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Oct 1989. v. 70 (5). p. 1252-1260. maps. Includes references. (NAL Call No.: DNAL 410 EC7).

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**Grass and forb species for revegetation of mixed soil-lignite overburden in east central Texas.**

JSWCA3. Skousen, J.G. Call, C.A. Ankeny, Iowa Soil Conservation Society of America. Journal of soil and water conservation. Nov/Dec 1988. v. 42 (6). p. 438-442. Includes references. (NAL Call No.: DNAL 56.8 J822).

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**Growth of forbs, shrubs, and trees on bentonite mine spoil under greenhouse conditions.**

JRMGA. Uresk, D.W. Yamamoto, T. Denver, Colo. : Society for Range Management. Journal of range management. Mar 1986. v. 39 (2). p. 113-117. Includes references. (NAL Call No.: DNAL 60.18 J82).

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**An ill wind meets a windbreak.**

Brandle, J.R. Hintz, D.L. Ames, Iowa : Council for Agricultural Science and Technology. Science of food and agriculture. Nov 1987. v. 5 (4). p. 8-12. ill. Includes references. (NAL Call No.: DNAL S1.S44).

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JEVQAA. Schoenholtz, S.H. Burger, J.A.; Torbert, J.L. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Apr/June 1987. v. 16 (2). p. 143-146. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Potential use of tebuthiuron for site preparation in land-use conversion.**

GARBB. Smith, A.E. Athens, Ga. : The Stations. Research bulletin - University of Georgia, Agricultural Experiment Stations. June 1988. (360). 15 p. maps. Includes references. (NAL Call No.: DNAL S51.E2).

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PLDIDE. Oak, S.W. Tainter, F.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 289-293. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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**Some effects of grazing on soil and water in the eastern forest /J.H. Patric, J.D. Helvey.**

Patric, James H., 1922-. Helvey, J. D. Broomall, PA : U.S. Dept. of Agriculture, Forest Service, Northeastern Forest Experiment Station, 1986. No. 115 repeated in numbering. 25 p. : ill. ; 28 cm. Bibliography: p. 20-24. (NAL Call No.: DNAL aSD11.U56 no.115).

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**Surface soil removal and herbicide treatment: effects on soil properties and loblolly pine early growth.**

SSSJD4. Tuttle, C.L. Golden, M.S.; Meldahl, R.S. Madison, Wis. : The Society. Journal - Soil Science Society of America. Nov/Dec 1985. v. 49 (6). p. 1558-1562. ill. Includes references. (NAL Call No.: DNAL 56.9 S03).

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JSWCA3. Farrish, K.W. Ankeny, Iowa : Soil Conservation Society of America. Journal of soil and water conservation. Jan/Feb 1987. v. 42 (1). p. 55-57. maps. Includes references. (NAL Call No.: DNAL 56.8 J822).



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Vodak, M.C. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. In subseries: Nature Study Notes. 1985. (130). 6 p. Includes references. (NAL Call No.: DNAL S544.3.N5F7).

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**Abundance and distribution of *Lygus hesperus* (Heteroptera: Miridae) in two conifer nurseries in western Oregon.**

EVETEX. Schowalter, T.D. College Park, Md. : Entomological Society of America. Environmental entomology. June 1987. v. 16 (3). p. 687-690. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Acclimation and low-temperature tolerance of eight woody taxa.**

HJHSA. Lindstrom, D.M. Dirr, M.A. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1989. v. 24 (5). p. 818-820. Includes references. (NAL Call No.: DNAL SB1.H6).

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**Accumulated dead insects and killing agents reduce catches of spruce budworm (Lepidoptera: Tortricidae) male moths in sex pheromone traps.**

JEENAI. Sanders, C.U. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1986. v. 79 (5). p. 1351-1353. Includes references. (NAL Call No.: DNAL 421 J822).

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**Acidic deposition and tree growth. I. The use of stem analysis to study historical growth patterns.**

JEVQAA. LeBlanc, D.C. Raynal, D.J.; White, E.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1987. v. 16 (4). p. 325-333. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Acidic deposition and tree growth. II. Assessing the role of climate in recent growth declines.**

JEVQAA. LeBlanc, D.C. Raynal, D.J.; White, E.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1987. v. 16 (4). p. 334-340. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Acquisition of nuclear polyhedrosis virus from tree stems by newly emerged gypsy moth (Lepidoptera: Lymantriidae) larvae.**

EVETEX. Woods, S.A. Elkinton, J.S.; Podgwaite, J.D. Lanham, Md. : Entomological Society of America. Newly emerged gypsy moth, *Lymantria dispar* L., larvae were released onto tree stems that were disinfected with sodium hypochlorite,

sprayed with nuclear polyhedrosis virus (NPV), or left untreated to assess the importance of contaminated bark surfaces in transmitting NPV to newly emerged neonates after an epizootic. NPV mortality among released larvae was related to the degree of contamination of the bark surface and indicates that bark surfaces may play an important role in transmitting NPV, particularly in the year following an epizootic. Environmental entomology. Apr 1989. v. 18 (2). p. 298-301. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Action of 6-benzylamino purine and indole-3-butyric acid on development of immature embryos of *Populus deltoides* Bartr.**

Savka, M.A. Jokela, J.J.; Skirvin, R.M.; Dawson, J.O. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 140-148. ill. Includes references. (NAL Call No.: DNAL SD399.5.N6).

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**Acute ozone stress on eastern cottonwood (*Populus deltoides* Bartr.) and the pest potential of the aphid, *Chaitophorus populicola* Thomas (Homoptera: Aphididae).**

EVETEX. Coleman, J.S. Jones, C.G. College Park, Md. : Entomological Society of America. The effect of acute ozone exposure of eastern cottonwood (*Populus deltoides* Bartr.) on the survivorship, reproduction, and development of the aphid *Chaitophorus populicola* Thomas (Homoptera: Aphididae) was investigated. Cottonwoods were exposed to 397 microgram/m3 (0.20 ppm) ozone or charcoal-filtered air and infested with aphids on leaf plastochron index 5, 40 h after fumigation. Aphid performance was not significantly different on plants exposed to ozone compared with charcoal-filtered air-treated control plants. These data do not support the notion that aphid performance will directly increase on air pollution-stressed plants. We also examined settling and feeding preference of aphids for cottonwood leaves of different developmental ages. Aphids significantly preferred leaf plastochron index 5 to all other leaf ages. These data support hypotheses relating aphid leaf preference to stages of leaf development. Reproduction of the cottonwood leaf rust fungus (*Melampsora medusae* Thum.) and the imported willow leaf beetle (*Plagioderia versicolora* Laicharting) are reduced on ozone-fumigated plants (reported elsewhere). If aphid populations are affected by competition with these cottonwood pests for leaf resources, then aphid pest potential may actually increase in areas characterized by episodic ozone concentrations because of ozone-induced decreases in populations of *M. medusae* and *P. versicolora*. Environmental entomology. Apr 1988. v. 17 (2). p. 207-212. Includes references. (NAL Call No.: DNAL QL461.E532).



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Oak, S.W. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 246-251. maps. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Addition of periodical cicada nymphs to an oak forest: effects on cicada density, acorn production, and rootlet density.**

JKESA. Karban, R. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Apr 1985. v. 58 (2). p. 269-276. ill. Includes references. (NAL Call No.: DNAL 420 K13).

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**Administrative, economic, and technical observations in developing and maintaining an effective weed control program.**

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**Adult emergence, courtship, mating, and ovipositional behavior of *Tetrastichus gallerucae* (Hymenoptera: Eulophidae), a parasitoid of the elm leaf beetle (Coleoptera: Chrysomelidae).**

EVETEX. Hamerski, M.R. Hall, R.W. Lanham, Md. : Entomological Society of America. Reproductive behavior of the egg parasitoid *Tetrastichus gallerucae* (Fonscolombe) is described. Males show the same distinct behavioral pattern before and after copulation. Males were aggressive toward other males on or near parasitized egg masses. No overt female courtship behavior was observed. Males mated more than once, but females were unreceptive after a successful copulation. Oviposition and associated behavior for each female was >8 h on elm leaf beetle, *Xanthogaleruca* (=Pyrrhalta) luteola (Muller), egg masses of 20 eggs. Females did not show any egg guarding or external marking behavior. Possible costs of female ovipositional behavior and male guarding behavior are discussed. Environmental entomology. Oct 1989. v. 18 (5). p. 791-794. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Adult feeding and distribution of *Dynastes granti* Horn (Coleoptera: Scarabaeidae).**

COBLA. Menke, A.S. Parker, F.D. Chicago, Ill. : Coleopterists Society. The Coleopterists' bulletin. June 1988. v. 42 (2). p. 161-164. Includes references. (NAL Call No.: DNAL 421 C674).

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**Aerial application of ethephon is ineffective in controlling lodgepole pine dwarf mistletoe.**

Robbins, K. Johnson, D.W.; Hawksworth, F.G.; Nicholls, T.H. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Jan 1989. v. 4 (1). p. 27-28. Includes references. (NAL Call No.: DNAL SD388.W6).

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**Aerial field tests of five insecticides on western spruce budworm in Idaho and Montana, 1978-1980.**

Markin, G.P. Johnson, D.R. Berkeley, Calif. : The Station. USDA Forest Service research note PSW - United States Pacific Southwest Forest and Range Experiment Station. June 1986. (385). 5 p. Includes references. (NAL Call No.: DNAL A99.9 F7652).

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**The aerial war against Eastern Region forest insects, 1921-86.**

Paananen, D.M. Fowler, R.F.; Wilson, L.F.  
Durham, N.C. : Forest History Society. Journal  
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**Agency subsidization of a rapidly spreading exotic.**

WLSBA. Olson, T.E. Knopf, F.L. Bethesda, Md. :  
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**Aggressiveness, competitiveness, and stability of tolerance of benzimidazole-tolerant strains of *Ceratocystis ulmi*.**

PLDRA. Schreiber, L.R. Conaway, E.E.; Peacock,  
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**Air pollutants effects on forest ecosystems May 8-9, 1985 St. Paul MN /major sponsors, The National Acid Precipitation Assessment Program, U.S.D.A. Forest Service ... et al. ; coordinated by the Acid Rain Foundation. --.**

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Close, E. Fort Collins, Colo. : The Service.  
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JAFCAU. Miles, D.H. Ly, A.M.; Randle, S.A.;  
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**All the king's horses and all the king's men: The lessons of 2,4,5-T.**

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**Allelochemical resistance of bald cypress, *Taxodium distichum*, Heartwood to the Subterranean termite, *Coptotermes formosanus*.**

JCECD. Scheffrahn, R.H. Hsu, R.C.; Su, N.Y.;  
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JCECD. Gilmore, A.R. New York, N.Y. : Plenum  
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v. 11 (5). p. 583-592. Includes references.  
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**Allelopathic effects of Kentucky bluegrass on northern red oak and yellow-poplar.**

JOARD. Kolb, T.E. Urbana, Ill. : International  
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**Allelopathic effects of pinyon and juniper litter on emergence and growth of herbaceous species.**

Everett, R.L. Washington, D.C.? : U.S. Dept.  
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### **Allelopathic effects of shrubs of the sand pine scrub on pines and grasses of the sandhills.**

FDSCA. Richardson, D.R. Williamson, G.B. Bethesda, Md. : Society of American Foresters. Aqueous leachates prepared monthly from foliage of eight species and from litter of two of them from Florida's sand pine scrub community were tested for potential inhibitory activity on four receiver species: three grasses native to Florida's sandhill community (*Andropogon gyrans*, *Schizachyrium scoparium*, and *Leptochloa dubia*) and commercial lettuce (*Lactuca sativa*). Seed germination of the grasses was inhibited significantly by all ten leachates. Inhibition varied with month of preparation of the samples and was highly correlated with monthly precipitation. However, only two of ten leachates significantly inhibited radicle growth of the grasses, with a seasonal peak in late spring before the rainy season. Leachates from species dominant on open scrub sites were much more inhibitory than those from mature scrub. Lettuce seed germination was inhibited significantly, whereas radicle length was stimulated; neither effect exhibited significant seasonal variation. *Andropogon gyrans* watered with runoff from leaf misting of potted *Ceratiola ericoides* and *Conradina canescens* had significantly lower dry weights than control seedlings receiving distilled water. In a field transplant experiment designed to control resource competition, seedling pines (*P. palustris*, *P. elliotii*, *P. clausa*) and plugs of wiregrass (*Aristida stricta*) grew more slowly at scrub sites than at sandhill sites. Chemicals released from the shrubs may deter pines and grasses that otherwise provide fuel for surface fires which cause shrub mortality. For Sci. 34(3):592-605. Forest science. Sept 1988. p. 592-605. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Allelopathic potential of coniferous species to old-field weeds in eastern Quebec.**

FDSCA. Jobidon, R. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1986. v. 32 (1). p. 112-118. ill. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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ANURA. Boes, T.K. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. Jan 15, 1986. v. 163 (2). p. 67-72. Includes references. (NAL Call No.: DNAL 80 AM371).

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### **Alteration of cell-wall water content and elasticity in Douglas-fir during periods of water deficit.**

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### **Altitudinal variation in nitrogenase activity of the Himalayan alder naturally regenerating on landslide-affected sites.**

NEPHA. Sharma, E. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 411-416. Includes references. (NAL Call No.: DNAL 450 N42).

3406

### **Aluminum effects on northern red oak seedling growth in six forest soil horizons.**

SSSJD4. Joslin, J.D. Wolfe, M.H. Madison, Wis. : The Society. The response of northern red oak (*Quercus rubra* L.) seedlings to varying levels of soil Al was examined in a 16-wk greenhouse study. Forest soil samples representing three soil series were used as growth media: Captina (Fragiudult, Missouri), Lexington (Paleudalf, Mississippi) and Becket (Fragiorthod, New York). Soil from two horizons from each series was separately amended in four treatments to create a wide range of soil Al availability: (i) control, (ii) limed  $\text{Ca}(\text{OH})_2$ , (iii) acidified (HCl), (iv) acidified with supplemental calcium added (+HCl and  $\text{CaSO}_4$ ). Treatments significantly ( $p$  less than 0.05) altered soil pH (range 3.65 to 5.48), base saturation, and 0.01 M  $\text{SrCl}_2$ -extractable Al (range 0.6-37.2 mg kg<sup>-1</sup>). Compared to controls, both acidification treatments resulted in significant reductions in fine root and foliar biomass production or in fine root branching, in all horizons except the highly organic Bhs of the Fragiorthod. In the remaining five horizons, fine root branching and biomass production were highly and negatively correlated ( $R^2 = 0.70$  and  $0.50$ , respectively) with 0.01 M  $\text{SrCl}_2$ -extractable Al. Although fine root tissue concentrations of Al correlated highly with 0.01 M  $\text{SrCl}_2$ -extractable Al levels, root tissue Al predicted root branching and biomass only moderately well ( $R^2 = 0.30$  and  $0.21$ , respectively). Fine root branching was more sensitive to treatment effects than either root biomass production or root elongation. Reductions in foliar biomass appeared to be secondary responses to direct effects on root systems. Present soil Al levels and acidic deposition rates appear to pose no threat to northern red oak in the southern portion of its range, whereas the possibility of Al toxicity in northeastern Spodosols deserves further study. Soil Science Society of America journal. Jan/Feb 1989. v. 53 (1). p. 274-281. Includes references. (NAL Call No.: DNAL 56.9 S03).

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Aluminum in foliage and bark of Black Alder, Eastern Cottonwood, and White Basswood. IFRRRA. David, M.B. Cote, B.; Vance, G.F. Urbana, Ill. : The Station. Forestry research report - Agricultural Experiment Station, University of Illinois. Aug 1988. (88-7) AGL. 6 p. Includes references. (NAL Call No.: DNAL SD12.I3I4).

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Analysis of forest fertilizer experiments: obtaining better precision and extracting more information.

FDSCA. Woollons, R.C. Whyte, A.G.D. Bethesda, Md. : Society of American Foresters. Later-age forest fertilizer experiments can be quite difficult to analyze appropriately and in ways that extract all the information inherent in the collected data. Observed responses are likely to be partially confounded with variations in pretreatment stand development, most of which can be removed through analyses of covariance using quanta of initial growing stock as a covariate. Pretreatment growth rate may represent an even more discerning covariate. Rather than use covariance some authors have chosen, instead, to use arithmetical procedures to adjust treatment responses. Reanalysis of a Canadian experiment of this latter kind suggests that such methodology may be less than ideal, and should not be preferred to covariance analysis. A general and systematic procedure for examining forest nutrition experiments is proposed for those involving  $t$  treatments, and also those where the  $t$  treatments represent  $n$  factors at  $p$  levels in factorial combination. An example of adopting the recommendation methodology for the first type is given using a completely randomized experiment in naturally regenerated radiata pine in New Zealand with five replications of four treatments. Adoption of the suggested procedures in conjunction with two covariates provides a useful insight into the data, and appreciably increases precision. The system is sequential in structure, necessarily inducing some risk of erroneous hypothesis testing. Such a danger is usually minimal, however, and the suggested system, it is claimed, represents a useful method for isolating treatment and growth effects in forest fertilizer trials. For. Sci. 34(3):769-780. Forest science. Sept 1988. p. 769-780. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Analysis of the  $3/2$  power law of self-thinning. FDSCA. Zeide, B. Bethesda, Md. : Society of American Foresters. Forest science. June 1987. v. 33 (2). p. 517-537. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Anatis mall (Say), a coccinellid predator of spruce budworm, Choristoneura fumiferana egg masses.

MAMRA. Houseweart, M.W. Lawrence, R.K. Orono, Me. : The Station. Miscellaneous report - University of Maine Agricultural Experiment Station. Apr 1986. (314). 6 p. ill. Includes references. (NAL Call No.: DNAL 100 M28M).

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Anatomical changes and peroxidase activity after cytokinin treatments inducing adventitious bud formation on embryos of Picea abies.

BOGAA. Arnold, S. von. Gronroos, R. Chicago, Ill. : University of Chicago Press. Botanical gazette. Dec 1986. v. 147 (4). p. 425-431. ill. Includes references. (NAL Call No.: DNAL 450 B652).

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Anatomy and physiology related to chemical movement in trees.

JOARD. Chaney, W.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1986. v. 12 (4). p. 85-91. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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Animal damage control /Cooperative Extension Service, Purdue University.

West Lafayette, Ind. : Cooperative Extension Service, Purdue University. Description based on: ADC-10 (published in 1987); title from caption. v. : ill. ; 28 cm. (NAL Call No.: DNAL SB599.A47).

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Animal impacts.

DeByle, N.V. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. 1985. (119). p. 115-123. ill. (NAL Call No.: DNAL aSD11.A42).

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Another gypsy moth parasite studied  
Glyphapanteles flaviocoxis.

CRSOA. Madison, Wis. : American Society of Agronomy. Crops and soils magazine. Jan 1985. v. 37 (4). p. 29-30. ill. (NAL Call No.: DNAL 6 W55).



## (FORESTRY RELATED)

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**Antennal olfactory and behavioral response of southern pine beetle, *Dendroctonus frontalis*, to analogs of its aggregation pheromone frontalin.**

JCECD. Payne, T.L. Andryszak, N.A.; Wieser, H.; Dixon, E.A.; Brahim, N.; Coers, J. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1988. v. 14 (4). p. 1217-1225. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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**Antennal olfactory responsiveness of three sympatric *Ips* species *Ips avulus* (Eichhoff), *Ips calligraphus* (Germar), *Ips grandicollis* (Eichhoff), to intra- and interspecific behavioral chemicals.**

JCECD. Smith, M.T. Busch, G.R.; Payne, T.L.; Dickens, J.C. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1988. v. 14 (4). p. 1289-1304. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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**Anthrachnose diseases of eastern hardwoods.**

Berry, F.H. Washington, D.C. : The Service. Forest insect & disease leaflet - U.S. Department of Agriculture Forest Service. Dec 1985. (133,rev.). 8 p. ill. Includes references. (NAL Call No.: DNAL A423.9 F764).

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**Apical control of compression wood action in white pine branches.**

WOSTBE. Wilson, B.F. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1986. v. 20 (2). p. 111-117. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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**Appearance of damage symptoms and reinfestation rates for Christmas trees attacked by the Zimmerman pine moth, *Dioryctria Zimmermani* (Lepidoptera: Pyralidae).**

GRLEA. Yonker, J.W. Schuder, D.L. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Spring 1987. v. 20 (1). p. 25-29. Includes references. (NAL Call No.: DNAL QL461.M5).

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**Application and use of herbicides in forest and industrial right-of-way sites.**

Kidd, F.A. Champaign, Ill. : Weed Science Society of America. Monograph series of the Weed Science Society of America. In the series analytic: Methods of applying herbicides / edited by C.G. McWhorter and M.R. Gebhardt. Literature review. 1987. (4). p. 297-312. ill. Includes references. (NAL Call No.: DNAL SB610.M65).

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**Application of a nuclear polyhedrosis virus of *Neodiprion taedae linearis* Ross on pine: persistence and effect of timing on larval mortality.**

GENSAB. Young, S.Y. Yearian, W.C. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. July 1986. v. 21 (3). p. 193-200. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Application of an evapotranspiration model to estimating understory removal effects in a douglas-fir forest.**

Kelliher, F.M. Black, T.A. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 259-262. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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**Application of growth models for simulating genetic gain of loblolly pine.**

FDSCA. Knowe, S.A. Foster, G.S. Bethesda, Md. : Society of American Foresters. A technique for predicting genetic gain in progeny tests using height-age models and stand-stimulations is presented for loblolly pine (*Pinus taeda* L.). Periodic remeasurements for a block-plot open-pollinated progeny test are used to examine trends in height growth, selection differential, and percent gain in height and volume. Using the Chapman-Richards model and approximate F tests, significant differences among families were detected in asymptote and rate parameters but not for the shape parameter. Separate base-age invariant height-age equations were developed for each family to account for polymorphism associated with the rate parameter. Selection differential calculated from either observed or predicted heights exhibited similar-trends although estimates from the height-age equations are consistently higher than obtained with observed height after age 5. Family rankings using the height-age models are consistent with those obtained using observed heights. Also, percent gain calculated from predicted heights is

within 2% of the estimates obtained with observed heights at ages greater than 3 years. Differences in survival, height, and diameter were combined to examine trends in volume production associated with families. Predicted volume for each family was simulated using a bivariate distribution of height and diameter accounting for differences in height-growth patterns among families. Family rankings for volume are also closely correlated, resulting in two or three of the same families being selected using observed and predicted data. Selection differential obtained from simulated and observed volume fluctuates in rank producing a satisfactory trend based on predicted volume after age 5. Gain based on simulated volume tends to be slightly greater than gain based on observed volume. Estimates of percent gain obtained by reinitializing the simulations with quadratic mean dbh and residual trees per acre after thinning differed more from the observed trends than Forest science. Mar 1989. v. 35 (1). p. 211-228. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Applications of biotechnology in forest tree improvement.**

Hanover, J.W. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 59-70. ill. (NAL Call No.: DNAL A99.9 F769).

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**Applying herbicides with a modified automatic drench syringe.**

TPLNA. Boyd, R.J. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Winter 1985. v. 36 (1). p. 26-27. ill. (NAL Call No.: DNAL 1.962 C5T71).

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**Appropriate silviculture.**

XGNEA. Blum, B.M. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 185-191. Includes references. (NAL Call No.: DNAL aSD11.U56).

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**Arboreal spiders (Araneae) on balsam fir and spruces in east-central Maine.**

JARCD. Jennings, D.T. Dimond, J.B. Lubbock, Tex. : American Arachnological Society. The journal of arachnology. Summer 1988. v. 16 (2). p. 223-235. maps. Includes references. (NAL Call No.: DNAL QL451.J6).

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**Are seed and cone pathogens causing significant losses in Pacific Northwest seed orchards?**

XPNWA. Nelson, E.E. Thies, W.G.; Li, C.Y. Portland, Or. : The Station. PNW research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. Jan 1986. (436). 5 p. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

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**Armillaria root disease.**

Williams, R.E. Shaw, C.G. III; Wargo, P.M.; Sites, W.H. Washington, D.C. : The Service. Forest insect & disease leaflet - U.S. Department of Agriculture Forest Service. Aug 1986. (78,rev.). 8 p. ill. Includes references. (NAL Call No.: DNAL A423.9 F764).

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**Armillaria root rot: the puzzle is being solved.**

PLDRA. Wargo, P.M. Shaw, C.G. III. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1985. v. 69 (10). p. 826-832. ill. Includes 23 references. (NAL Call No.: DNAL 1.9 P69P).

3432

**The armored scales of hemlock.**

McClure, M.S. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 45-65. ill., maps. Includes references. (NAL Call No.: DNAL SB761.D96).

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**Artificial selection for host suitability and development length of the gypsy moth (Lepidoptera: Lymantriidae) parasite, Cotesia melanoscela (Hymenoptera: Braconidae).**

JEENAI. Weseloh, R.M. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1986. v. 79 (5). p. 1212-1216. Includes references. (NAL Call No.: DNAL 421 J822).

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**Ash/lilac borer.**

WAEB. Spackman, E. Laramie, Wyo. : The Station. B - Wyoming Agricultural Experiment Station. Jan 1988. (902). 2 p. ill. (NAL Call No.: DNAL 100 W99 (1)).



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### Aspects of cone and ovule ontogeny in *Cryptomeria* (Taxodiaceae).

AJBOAA. Takaso, T. Tomlinson, P.B. Columbus, Ohio : Botanical Society of America. American journal of botany. May 1989. v. 76 (5). p. 692-705. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

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### Aspen mortality following sludge application in Michigan.

Hart, J.H. Hart, J.B.; Nguyen, P.V. Seattle : University of Washington Press, 1986. The Forest alternative for treatment and utilization of municipal and industrial wastes / edited by Dale W. Cole, Charles L. Henry, and Wade L. Nutter. p. 266-271. ill. Includes references. (NAL Call No.: DNAL TD897.F65).

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### Aspen sucker damage and defect in Colorado clearcut areas.

XFRMA. Hinds, T.E. Sheppard, W.D. Fort Collins, Colo. : The Station. USDA Forest Service research paper RM - United States, Rocky Mountain Forest and Range Experiment Station. Oct 1987. (278). 12 p. ill., maps. Includes references. (NAL Call No.: DNAL A99.9 F7632U).

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### Assessing forest damage in high-elevation coniferous forests in Vermont and New Hampshire using thematic mapper data.

RSEEA. Vogelmann, J.E. Rock, B.N. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Mar 1988. v. 24. p. 227-246. ill. Includes references. (NAL Call No.: DNAL Q184.R4).

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### Assessing risk to plantation investments from insect attacks.

Anderson, W.C. Guldin, R.W.; Vasievich, J.M. New Orleans, La. : The Station. USDA Forest Service research paper SO - Southern Forest Experiment Station. Mar 1987. (231). 6 p. Includes references. (NAL Call No.: DNAL A99.9 F7628US).

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JFUSA. Anderson, W.C. Guldin, R.W.; Vasievich, J.M. Bethesda, Md. : Society of American Foresters. Journal of forestry. Jan 1987. v. 85 (1). p. 46-47. Includes references. (NAL Call No.: DNAL 99.8 F768).

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### Assessing the risk of lodgepole pine stand destruction by pests.

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### Assessment of aerial spray deposits in a spruce forest using in-flight microencapsulation technique.

JPFCD2. Himel, C.M. Sundaram, A.; Sundaram, K.M.S.; Cadogan, B.L.; Villaveces, A. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1987. v. 22 (2). p. 195-219. ill. Includes references. (NAL Call No.: DNAL TD172.U61).

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### Assessment of wildlife damage on southern forests.

Miller, J.E. Bethesda, Md. : The Society. Proceedings of the...Society of American Foresters National Convention. 1986. p. 180-185. Includes references. (NAL Call No.: DNAL SD143.S64).

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### Astringency of Douglas-fir foliage in relation to phenology and xylem pressure potential.

JCECD. Horner, J.D. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1988. v. 14 (4). p. 1227-1237. Includes references. (NAL Call No.: DNAL QD415.A1U6).

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### Atmospheric deposition effects on loblolly pine: development of an intensive field research site.

Chappelka, A.H. Lockaby, B.G.; Meldahl, R.S.; Kush, J.S. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 57-60. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Attempts to improve penetration of waterborne preservatives in spruce and jack pine lumber.**  
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**An automated system for timing insecticidal sprays for Nantucket pine tip moth control.**  
SJAFD. Pickering, J. Ross, D.W.; Berisford, C.W. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Nov 1989. v. 13 (4). p. 184-187. maps. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Avermectin B1a and milbemycin D as contact toxicants for gypsy moth (Lepidoptera: Lymantriidae) larvae and eggs.**  
JEENAI. Deecher, D.C. Brezner, J.; Tanenbaum, S.W. Lanham, Md. : Entomological Society of America. At 24 h the LD50 of Avermectin B1a for third-instar gypsy moth, *Lymantria dispar* L., was 0.024 microgram/g and 0.124 microgram/g for sixth instars. The LD50 for Milbemycin D was 0.119 microgram/g for third instar, but sixth instars were not affected. Milbemycin demonstrated a faster paralytic (lethal) response than Avermectin for third instars. Egg hatch was reduced after 10 ppm of either chemical contacted the chorion. At 1 ppm, Avermectin had little effect on hatch but resulted in the death of newly emerging larvae. Milbemycin had no effect on hatch or larvae at 1 ppm. Although both compounds are toxic to the gypsy moth, differences in instar susceptibility indicate possible anatomical differences related to metamorphosis, multiple receptors, or physiological biotransformation. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1284-1287. Includes references. (NAL Call No.: DNAL 421 J822).

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references. (NAL Call No.: DNAL 100 F92).

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**Balsam woolly adelgid: a pest of true fir species.**

WUEXA. Antoneilli, A.L. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. In subseries: Insect Answers. Aug 1987. (1456). 3 p. ill. Includes references. (NAL Call No.: DNAL 275.29 W27P).

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**The balsam woolly adelgid in North America.**

Hain, F.P. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 87-109. ill. Includes references. (NAL Call No.: DNAL SB761.D96).

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Santos, G.L. Cuddihy, L.W.; Stone, C.P. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 99. (NAL Call No.: DNAL 79.9 W52R).

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SWSPB. Griswold, H.C. Gonzalez, F.E. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 226-230. Includes 5 references. (NAL Call No.: DNAL 79.9 S08).

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**Banded herbicides can be as effective as windrowing.**

SWSPB. Miller, J.H. Andrews, G.W. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 216-225. Includes 7 references. (NAL Call No.: DNAL 79.9 S08).



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**Bark stripping by white-tailed deer in West Virginia.**

Michael, E.D. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. June 1987. v. 4 (2). p. 96-97. Includes references. (NAL Call No.: DNAL SD143.N6).

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**Basal bark sprays evaluated for efficacy and season of application.**

AKFRAC. Yeiser, J.L. McLemore, B.F. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. Nov/Dec 1986. v. 35 (6). p. 10. (NAL Call No.: DNAL 100 AR42F).

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**Basamid and solar heating effective for control of plant-parasitic nematodes at Bessey Nursery, Nebraska.**

Hildebrand, D.M. Dinkel, G.B. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 139-144. Includes references. (NAL Call No.: DNAL aSD11.A42).

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SWSPBE. Bullard, S.H. Richardson, R.D. Jr.; Straka, T.J. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 195-198. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Bayleton (triadimefon) affects ectomycorrhizal development on slash and loblolly pine seedlings in nurseries.**

Marx, D.H. Cordell, C.E. Auburn, Ala.? Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 460-475. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

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SWSPBE. Hammond, W.J. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 189-193. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Beetle from Australia threatens eucalyptus.**

CAGRA. Scriven, G.T. Reeves, E.L.; Luck, R.F. Berkeley, Calif. : The Station. California agriculture - California Agricultural Experiment Station. July/Aug 1986. v. 40 (7/8). p. 4-6. ill. (NAL Call No.: DNAL 100 C12CAG).

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JFUSA. Sheffield, R.M. Cost, N.D. Bethesda, Md. : Society of American Foresters. Journal of forestry. Jan 1987. v. 85 (1). p. 29-33. ill., maps. Includes references. (NAL Call No.: DNAL 99.8 F768).

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**Benomyl root treatment controls brown-spot disease on longleaf pine in the southern United States.**

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**Between-year population variation in resistance of Douglas-fir to the western spruce budworm.**

ACSMC. Cates, R.G. Redak, R.A. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. 1986. (296). p. 106-115. Includes 10 references. (NAL Call No.: DNAL QD1.A45).

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**Big leaf maple in Douglas-fir forests: effects on soils; seedling establishment and early growth.**

XFGTB. Fried, J.S. Berkeley, Calif. : The Station. USDA Forest Service general technical report PSW - United States, Pacific Southwest Forest and Range Experiment Station. Paper presented at the "Symposium on Multiple-Use Management of California's Hardwood Resources," November 12-14, 1986, San Luis Obispo, California. Nov 1987. (100). p. 435. (NAL Call No.: DNAL aSD11.A325).

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**Bioassay indicates a metabolite of hexazinone affects phytosynthesis of loblolly pine (*Pinus taeda*).**

WEESA6. Sung, S.J.S. South, D.B.; Gjerstad, D.H. Champaign, Ill. : Weed Science Society of America. Weed science. July 1985. v. 33 (4). p. 440-442. Includes 16 references. (NAL Call No.: DNAL 79.8 W41).

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**Bioassay of formulations of *Bacillus thuringiensis* for use in forestry: panel discussion of the role of the bioassay in standardizing formulation of *Bacillus thuringiensis*.**

XGNEA. Dulmage, H.T. Dubois, N.R. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 161-168. Includes references. (NAL Call No.: DNAL aSD11.U56).

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JEENAI. Sturgeon, K.B. Mitton, J.B. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1986. v. 79 (4). p. 1064-1068. Includes references. (NAL Call No.: DNAL 421 J822).

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ACSMC. Johnson, M.A. Croteau, R. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. Paper presented at the symposium on "Ecology and Metabolism of Plant Lipids" sponsored by the Division of Agricultural and Food Chemistry at the 189th Meeting of the American Chemical Society, Apr 28/May 3, 1985, Miami Beach. 1986. (325). p.

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boernerii had displaced *P. coloradensis* in all 3 previously cohabited pine stands and in 7 of 12 others where *P. coloradensis* initially had occurred alone and where *P. boernerii* invaded subsequently. In four of the five remaining stands in the latter category, *P. coloradensis* had been reduced to very low density. These results reaffirm the superior competitive ability of *P. boernerii* demonstrated in laboratory experiments. Environmental entomology. Dec 1989. v. 18 (6). p. 1066-1073. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

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Prior to budbreak, starch content declined rapidly, stabilizing at pre-grafting levels during shoot elongation. Grafts with misaligned unions accumulated starch during the first week, but the starch content then declined. Preventing photosynthesis in scions during union formation prevented starch accumulation, but did not affect graft success or subsequent scion growth. We concluded that neither starch accumulation nor current photosynthesis in the scion were required during union development. Journal of the American Society for Horticultural Science. Sept 1988. v. 113 (5). p. 796-799. Includes references. (NAL Call No.: DNAL 81 SD12).

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JOSHB. Beeson, R.C. Jr. Proebsting, W.M. Alexandria, Va. : The Society. The study evaluated the roles of storage carbohydrates and neutral lipids in the success of Colorado blue spruce (*Picea pungens* Englemann 'Hoopsi') grafts. These scions do not require photosynthesis nor receive photosynthates from the rootstock during union development. Carbohydrate and neutral lipid contents, along with respiration and scion water relations, were measured during union development. Stored carbon compounds were sufficient to supply the needs of the scion during the 9 weeks of union development. Estimates of carbohydrate use indicated that decreases in sugar content (bark and needle) were insufficient to account for more than 25% of the estimated respiration. The results indicate that the quantity of carbon storage compounds is not a factor in graft success. We propose that neutral lipids may be the major carbon reserve of the scion during graft formation. Journal of the American Society for Horticultural Science. Sept 1988. v. 113 (5). p. 800-805. Includes references. (NAL Call No.: DNAL 81 SD12).

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TPLNA. Brown, K.R. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Spring 1989. v. 40 (2). p. 25-29. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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**Characterization of historical growth patterns in declining red spruce trees.**

LeBlanc, D.C. Raynal, D.J.; White, E.H.; Ketchledge, E.H. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 360-371. Includes references. (NAL Call No.: DNAL QK477.2.A615 1986).

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**Characterization of sucrolysis via the uridine diphosphate and pyrophosphate-dependent sucrose synthase pathway.**

PLPHA. Xu, D.P. Sung, S.J.S.; Loboda, T.; Kormanik, P.P.; Black, C.C. Rockville, Md. : American Society of Plant Physiologists. The breakdown of sucrose to feed both hexoses into glycolytic carbon flow can occur by the sucrose synthase pathway. This uridine diphosphate (UDP) and pyrophosphate (PPi)-dependent pathway was biochemically characterized using soluble extracts from several plants. The sucrolysis process required the simultaneous presence of sucrose, UDP, and PPi with their respective Km values being about 40 millimolar, 23 micromolar, and 29 micromolar. UDP was the only active nucleotide diphosphate. Slightly alkaline pH optima were observed for sucrose

breakdown either to glucose 1-phosphate or to triose phosphate. Sucrolysis increased with increasing temperature to near 50 degrees C and then a sharp drop occurred between 55 and 60 degrees C. The breakdown of sucrose to triose-P was activated by fructose 2,6-P2 which had a Km value near 0.2 micromolar. The cytoplasmic phosphofructokinase and fructokinase in plants were fairly nonselective for nucleotide triphosphates (NTP) but glucokinase definitely favored ATP. A predicted stoichiometric relationship of unity for UDP and PPi was measured when one also measured competing UDPase and pyrophosphatase activity. The cycling of uridylates, UDP to UTP to UDP, was demonstrated both with phosphofructokinase and with fructokinase. Enzyme activity measurements indicated that the sucrose synthase pathway has a major role in plant sucrose sink tissues. In the cytoplasmic sucrose synthase breakdown pathway, a role for the PPi-phosphofructokinase was to produce PPi while a role for the NTP-phosphofructokinase and for the fructokinase was to produce UDP. Plant physiology. June 1989. v. 90 (2). p. 635-642. Includes references. (NAL Call No.: DNAL 450 P692).

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**Chemical climate of North American relevant to forests.**

Husar, R.B. St. Paul, Minn. : Acid Rain Foundation, c1985. Air pollutants effects on forest ecosystems : May 8-9, 1985, St. Paul, MN / major sponsors, The National Acid Precipitation Assessment Program, USDA Forest Service ... et al. ; coordinated by the Ac. p. 5-38. ill., maps. Includes references. (NAL Call No.: DNAL QH545.A3A5).

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**Chemical control of three white grub species (Coleoptera: Scarabaeidae) attacking Fraser fir Christmas trees in the southern Appalachians.**

JESCEP. Kard, B.M.R. Hain, F.P. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Jan 1987. v. 22 (1). p. 84-89. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Chemical control of unwanted hardwoods by injection.**

SWSPBE. McLemore, B.F. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 254-258. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Chemical control of weed trees in autumn instead of spring.**

TFHSA. Woods, F.W. Evans, R.M. Knoxville, Tenn. : The Station. Tennessee farm and home science - Tennessee Agricultural Experiment Station. Spring 1987. (142). p. 3-5. ill. Includes references. (NAL Call No.: DNAL 100 T25F).

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**Chemical insecticides for spruce budworm.**

XGNEA. Helson, B.V. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 131-135. Includes references. (NAL Call No.: DNAL aSD11.U56).

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**Chemical site preparation for conservation land-use development.**

Smith, A.E. Goodroad, L.L. Athens, Ga. : Agricultural Experiment Stations, University of Georgia, 1985? . Proceedings of the 1985 Southern Region No-Till Conference : July 16-17, 1985, Griffin, Georgia / edited by W.L. Hargrove and F.C. Boswell and G.W. Langdale. p. 151-155. (NAL Call No.: DNAL S604.S6 1985).

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**Chemical treatments for brood control and suppression of Dendroctonus adjunctus attacks on ponderosa pine.**

SENTD. Kinzer, H.G. Reeves, J.M. College Station, Tex. : Southwestern Entomological Society. The Southwestern entomologist. Dec 1985. v. 10 (4). p. 244-252. Includes references. (NAL Call No.: DNAL QL461.S65).

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**Chemical variation in lodgepole pine with latitude, elevation, and diameter class.**

FPJDA. Kim, W.J. Campbell, A.G.; Koch, P. Madison, Wis. : Forest Products Research Society. Lodgepole pine (*Pinus contorta* var. *latifolia* and *murrayana*) is one of the most abundant and underutilized forest resources in the Northwest United States and Canada. This paper describes the chemical variation in lodgepole pine over its geographical range. The sample trees were collected from nine different latitudes (40 degrees to 60 degrees north), three elevations (low, medium, and high), and three diameter classes (76, 152, and 228 mm DBH). The average chemical composition of the *latifolia* stems was 0.26 percent ash, 2.87 percent extractives, 25.81 percent lignin, 80.40 percent holocellulose, and 49.64 percent alpha-cellulose. The average pH was 4.57. Ash,

lignin, and holocellulose were negatively correlated with latitude, while alpha-cellulose generally increased as latitude increased. The extractive content was positively correlated with latitude. The ash content and pH were negatively correlated with diameter class, while extractive content was positively correlated with diameter class. The *latifolia* and *murrayana* trees had similar chemical characteristics and no extreme chemical variabilities that would limit ordinary wood utilization. Forest products journal. Mar 1989. v. 39 (3). p. 7-12. maps. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Chemical vs mechanical site preparation after fuelwood harvesting.**

SWSPBE. Miller, J.H. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 156-166. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Chemical vs. mechanical site preparation for East Florida flatwoods: a pilot scale trial.**

SWSPB. Sage, R.D. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 213-215. (NAL Call No.: DNAL 79.9 S08).

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**Chemicals for control of common insect and mite pests in southern pine nurseries.**

SJAFD. Bacon, C.G. South, D.B. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1989. v. 13 (3). p. 112-116. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Chemistry and field evaluation of the sex pheromone of ponderosa pine tip moth, *Rhyacionia zozana* (Lepidoptera: Tortricidae).**

EVETEX. Niwa, C.G. Sower, L.L.; Daterman, G.E. College Park, Md. : Entomological Society of America. Environmental entomology. Dec 1987. v. 16 (6). p. 1287-1290. Includes references. (NAL Call No.: DNAL QL461.E532).



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### **Chemistry of lignin biodegradation.**

Chen, C.L. Chang, H.M. Orlando, Fla. : Academic Press, c1985. Biosynthesis and biodegradation of wood components / edited by Takayoshi Higuchi. p. 535-556. Includes references. (NAL Call No.: DNAL TS932.B56).

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### **Chitinase producing BT strains.**

XGNEA. Gunner, H.B. Zimet, M.; Berger, S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 103-108. Includes references. (NAL Call No.: DNAL aSD11.U56).

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### **Chlorophyll a fluorescence and photosynthetic and growth responses of Pinus radiata to phosphorus deficiency, drought stress, and high CO2.**

PLPHA. Conroy, J.P. Smillie, R.M.; Koppers, M.; Bevege, D.I.; Barlow, E.W. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. June 1986. v. 81 (2). p. 423-429. Includes 25 references. (NAL Call No.: DNAL 450 P692).

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### **Christmas tree pest management--weed, insect, and disease control recommendations.**

Cobb, P.P. Auburn, Ala. : The Service. Circular ANR - Cooperative Extension Service, Auburn University. Feb 1987. (453). 11 p. maps. (NAL Call No.: DNAL S544.3.A2C47).

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### **Christmas tree pests and pest management in the Northwest.**

PAARA. Merrill, W. Cameron, E.A. University Park, Pa. : The Station. Progress report - Pennsylvania Agricultural Experiment Station. Includes statistical data. July 1986. (388). 35 p. ill. (NAL Call No.: DNAL 100 P381P).

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### **Chronic herbivory: impacts on architecture and sex expression of pinyon pine.**

SCIEA. Whitman, T.G. Mopper, S. Washington, D.C. : American Association for the Advancement of Science. Science. May 31, 1985. v. 228 (4703). p. 1089-1091. ill. Includes 23 references. (NAL Call No.: DNAL 470 SCI2).

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### **Clare County: summary of gypsy moth impacts, management activities, and plans.**

MUCBA. Gould, L. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 14-15. maps. (NAL Call No.: DNAL 275.29 M58B).

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### **Classification of airborne multispectral scanner data for mapping current defoliation caused by the spruce budworm.**

FOSCA. Leckie, D.G. Ostaff, D.P. Bethesda, Md. : Society of American Foresters. Abstract: Airborne multispectral scanner data were acquired over a mixed fir and spruce forest affected by both current defoliation (red discoloration) and cumulative defoliation (loss of needles) caused by feeding of the spruce budworm (*Choristoneura fumiferana* Clem.). The spectral bands, ratios and differences of bands, and principal components derived from the bands were examined for their usefulness for discriminating defoliation condition. Classifications were conducted using the best combinations of two through nine bands or features derived from the bands. Three levels of current defoliation could be classified (heavy, light, and healthy). Cumulative defoliation and mixed-wood areas caused confusions in the classifications. There was little advantage to including more than four bands or derived features in the classifications. For SCI. 34(2):259-275. Forest science. June 1988. v. 34 (2). p. 259-275. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Climate and red spruce growth and decline in the northern Appalachians.**

PNASA. Johnson, A.H. Cook, E.R.; Siccama, T.G. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Aug 1988. v. 85 (15). p. 5369-5373. Includes references. (NAL Call No.: DNAL 500 N21P).

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### **Climatological discriminant model.**

XATBA. Kemp, W.P. Washington, D.C. : The Department. Technical bulletin - United States Dept. of Agriculture. In the series analytic: Managing trees and stands susceptible to western spruce budworm/edited by M.H. Brookes, J.J. Colbert, R.G. Mitchell and R.W. Stark. Dec 1985. (1695). p. 43-45. maps. (NAL Call No.: DNAL 1 AG84TE).

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**Climax or alternative steady states in woodland ecology.**

XGTIA. Jameson, D.A. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at a "Conference on Pinyon-Juniper," January 13-16, 1986, Reno, Nevada. Jan 1987. (215). p. 9-13. Includes references. (NAL Call No.: DNAL aSD11.A48).

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**Clonal development of coyote willow, *Salix exigua* (Salicaceae), and attack by the shoot-galling sawfly, *Euura exiguae* (Hymenoptera: Tenthredinidae).**

EVETEX. Price, P.W. Lanham, Md. : Entomological Society of America. Five clones of the willow, *Salix exigua* Nuttall, along the Weber River, Utah, produced shorter shoots with increasing ramet age. The number of ovipositions by the shoot-galling sawfly, *Euura exiguae* Smith, correlated positively with shoot length, so that sawfly density was high on younger ramets of a clone and low on older ramets. The sawfly attacked the most vigorous parts of the clones. Survival of progeny in galls decreased with ramet age from 60% survival on 1-yr-old ramets to 26% survival on 6-yr-old ramets when plant-induced mortality was considered alone. The effects of parasitoids on the pattern of sawfly attack was not significant. Survival of progeny in young ramets (2 and 3 yr old) was higher in the egg to very early first-instar stage (50%) than in older ramets (37%) (5 and 6 yr old), but differences were slight after that stage. The major determinants of *Euura* population distribution on willow clones were the female selective oviposition behavior on longer shoots on younger ramets, which probably evolved in response to higher survival of progeny in the younger ramets. When the relative effects of attack and survival were evaluated in response to ramet age, age accounted for 89% of the variance in attack and 95% of the variance in survival. The contrast between this species and others that attack vigorous plants and plant parts and those that attack stressed plants is emphasized, and an explanation is proposed for the difference between epidemic pest insect herbivores and those that remain as endemic species. Environmental entomology. Feb 1989. v. 18. p. 61-68. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Closed-cone conifers of the Chaparral.**

Zedler, P.H. Berkeley, Calif. : California Native Plant Society. Fremontia. Oct 1986. v. 14 (3). p. 14-17. ill. Includes references. (NAL Call No.: DNAL QK149.F69).

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**Coarse woody debris in Douglas-fir forests of western Oregon and Washington.**

ECOLA. Spies, T.A. Franklin, J.F.; Thomas, T.B. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Dec 1988. v. 69 (6). p. 1689-1702. maps. Includes references. (NAL Call No.: DNAL 410 EC7).

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**Cold-hardiness testing of conifer seedlings.**

Burr, K.E. Wallner, S.J.; Tinus, R.W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 104-108. Includes references. (NAL Call No.: DNAL aSD11.A42).

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***Colletotrichum gloeosporioides*, a possible biological control agent for *Clidemia hirta* in Hawaiian forests.**

PLDRA. Trujillo, E.E. Latterell, F.M.; Rossi, A.E. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1986. v. 70 (10). p. 974-976. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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**Colonization, emergence, and survival of *Hylurgopinus rufipes* and *Scolytus multistriatus* (Coleoptera: Scolytidae) in insecticide-treated elm wood.**

JEENAI. Phillipsen, W.J. Ascerno, M.E.; Landwehr, V.R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1986. v. 79 (5). p. 1347-1350. Includes references. (NAL Call No.: DNAL 421 J822).

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**Colorant use in low volume basal applications.**

SWSPBE. Byrd, C. Raleigh, N.C. : The Society Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 261-262. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Colorants for spray pattern identification.**

SWSPBE. Byrd, C.A. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 368-369. Includes references. (NAL Call No.: DNAL 79.9



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Call No.: DNAL 451 T63B).

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### **Comandra blister rust.**

Johnson, D.W. Washington, D.C. : The Service. Forest insect & disease leaflet - U.S. Department of Agriculture Forest Service. June 1986. (62,rev.). 8 p. ill., maps. Includes references. (NAL Call No.: DNAL A423.9 F764).

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### **Combatting insect pests of pine trees.**

Schuder, D.L. West Lafayette : The Service. Publication E - Purdue University, Cooperative Extension Service. In subseries: Ornamental Insects. Apr 1985. (32). 9 p. ill. (NAL Call No.: DNAL SB844.I6P8).

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### **Combustion losses of sulfur from forest foliage and litter.**

FOSCA. Tiedemann, A.R. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1987. v. 33 (1). p. 216-223. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Commercial production of microbials by Reuter Laboratories, Inc., for control of the gypsy moth and the spruce budworm.**

XGNEA. Obenchain, F.D. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 139-140. (NAL Call No.: DNAL aSD11.U56).

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### **Common insect pests of trees in the Great Plains.**

NEUAA. Lincoln, Neb. : The Service. EC - Cooperative Extension Service, University of Nebraska. 1986? . (86-1548). 44 p. ill. Includes references. (NAL Call No.: DNAL 275.29 N272EX).

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### **Community dynamics and topographic controls on forest pattern in Shenandoah National Park, Virginia.**

BTBCAL. Harrison, E.A. McIntyre, B.M.; Dueser, R.D. Bronx, N.Y. : The Club. The Bulletin of the Torrey Botanical Club. Jan/Mar 1989. v. 116 (1). p. 1-14. maps. Includes references. (NAL

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### **Companion planting of black walnut with autumn olive to control *Mycosphaerella* leaf spot of walnut.**

Kessler, K.J. Jr. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 285-288. ill. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

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### **Comparative drought physiology and biogeography of *Quercus gambelii* and *Quercus turbinella*.**

AMNAA. Neilson, R.P. Wullstein, L.H. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Oct 1985. v. 114 (2). p. 259-271. Includes references. (NAL Call No.: DNAL 410 M58).

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### **Comparative effects of the soil microflora on ectomycorrhizal inoculation of conifer seedlings.**

NEPHA. McAfee, B.J. Fortin, J.A. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 443-449. Includes references. (NAL Call No.: DNAL 450 N42).

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### **A comparative evaluation of the effects of acid precipitation, natural acid production, and harvesting on cation removal from forests / Dale W. Johnson ; co-investigators, J.M. Kelly ... et al. --.**

Johnson, D. W. Kelly, J. M. Oak Ridge, Tenn.? : Environmental Sciences Division, Oak Ridge National Laboratory?, 1985? . Cover title.~ "Task group project: F7-07."~ This research has been funded as part of the National Acid Precipitation Assessment Program by the Environmental Protection Agency under the Interagency Agreement Number 79DX0533 along with the Electr~ "DOE/OR/21400--T113."~ Publication no. 2508, Environmental Sciences. Div., ORNL.~ "DE85 O10821." 1 v. (various pagings) : ill. ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL QH545.A17J6).

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**Comparative mechanisms of host selection by insects attacking pine trees and crucifers.**  
Renwick, J.A.A. San Diego : Academic Press, 1988. Chemical mediation of coevolution / edited by Kevin C. Spencer. p. 303-316. Includes references. (NAL Call No.: DNAL QH372.C44).

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**Comparative physiology of successional forest trees.**  
Wallace, L.L. New York, N.Y. : Springer-Verlag. Ecological studies : analysis and synthesis. In the series analytic: Forest hydrology and ecology at Coweeta / edited by W.T. Swank and D.A. Crossley, Jr. Proceedings of a symposium held in October 1984, Athens, Georgia. 1988. v. 66. p. 181-189. (NAL Call No.: DNAL QH540.E288).

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**Comparison of a degree-day computer and a recording thermograph in a forest environment.**  
XPNWA. Wickman, B.E. Portland, Or. : The Station. PNW research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. Oct 1985. (427). 6 p. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

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**Comparison of a logged and unlogged forest stand in a Louisiana swamp.**  
PLAAA. Conner, W.H. S.l. : The Academy. The proceedings of the Louisiana Academy of Sciences. 1986. v. 49. p. 7-14. maps. Includes references. (NAL Call No.: DNAL 500 L932).

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**Comparison of adventitious shoot formation from mature embryos of longleaf pine, slash pine, and the hybrid, longleaf pine X slash pine.**  
Stine, M. Sommer, H.E. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 6-11. Includes references. (NAL Call No.: DNAL SD399.5.N6).

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**Comparison of BT formulations against the spruce budworm.**  
XGNEA. McCreery, L. Millers, I.; Souto, D.; Francis, B. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium:

Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 23-27. Includes references. (NAL Call No.: DNAL aSD11.U56).

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**Comparison of canopy position and other factors on seedling growth in *Acacia smallii*.**  
TJSCA. Lohstroh, R.J. Van Auken, O.W. Lubbock, Tex. : Texas Academy of Science. The Texas journal of science. Aug 1987. v. 39 (3). p. 233-239. Includes references. (NAL Call No.: DNAL 470 T31).

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**Comparison of chemical effectiveness by the multinomial logit technique.**  
JEENAI. Hughes, G.A. Robertson, J.L.; Savin, N.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1987. v. 80 (1). p. 18-28. Includes references. (NAL Call No.: DNAL 421 J822).

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**Comparison of four cold hardiness tests on three western conifers.**  
Burr, K.E. Tinus, R.W.; Wallner, S.J.; King, R.M. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 87-95. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Comparison of herbicides and mixtures for tree injection.**  
SWSPBE. McLemore, B.F. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 221-223. (NAL Call No.: DNAL 79.9 S08 (P)).

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**A comparison of images from a pushbroom scanner with normal color aerial photographs for detecting scattered recent conifer mortality.**  
PERSD. Knepeck, I.D. Ahern, F.J. Falls Church, Va. : American Society of Photogrammetry and Remote Sensing. Photogrammetric engineering and remote sensing. Mar 1989. v. 55 (3). p. 333-337. Includes references. (NAL Call No.: DNAL 325.28 P56).



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**Comparison of in situ and airborne spectral measurements of the blue shift associated with forest decline.**

RSEEA. Rock, B.N. Hoshizaki, T.; Miller, J.R. New York, N.Y. : Elsevier Science Publishing. Remote sensing of environment. Feb 1988. v. 24 (1). p. 109-127. Includes references. (NAL Call No.: DNAL Q184.R4).

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**Comparison of liquid and solid hexazinone formulations for pine release.**

Minogue, P.J. Zutter, B.R.; Gjerstad, D.H. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 292-299. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Comparison of site preparation methods for weed control in loblolly pine (*Pinus taeda*) plantations.**

WEESA6. Lantagne, D.O. Burger, J.A. Champaign, Ill. : Weed Science Society of America. Weed science. July 1987. v. 35 (4). p. 590-593. Includes references. (NAL Call No.: DNAL 79.8 W41).

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**A comparison of three granulosis viruses isolated from *Choristoneura* spp.**

JIVPA. Arif, B.M. Guangyu, Z.; Jamieson, P. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. Sept 1986. v. 48 (2). p. 180-186. ill. Includes references. (NAL Call No.: DNAL 421 J826).

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**Comparison of three soil fumigants in a barefoot conifer nursery.**

TPLNA. Campbell, S.J. Kelpsas, B.R. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1988. v. 39 (4). p. 16-22. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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**Comparison of three techniques to determine Al content in micro-samples of plant material.**

CSOSA2. Thornton, F.C. Schaedle, M.; Raynal, D.J. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. 1985. v. 16 (9). p. 931-941. Includes

references. (NAL Call No.: DNAL S590.C63).

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**Comparison of two isolates of *Bacillus thuringiensis* in a field test on western spruce budworm (*Lepidoptera: Tortricidae*).**

JEENAI. Stelzer, M.J. Beckwith, R.C. College Park, Md. : Entomological Society of America. Abstract: Two isolates of *Bacillus thuringiensis* formulated as Thuricide 32LV and SAN-415 32LV were compared for efficacy against western spruce budworm, *Choristoneura occidentalis* Freeman, in Oregon. The products were applied by helicopter at 20 and 30 billion International Units (BIU) in a spray volume of 7.1 liters/ha. The 30 BIU per ha dosage provided better population control than the 20 BIU dosage with both *B. thuringiensis* isolates; however, only the difference between dosages for the SAN-415 32LV formulation was significant. Differences in efficacy between the two *B. thuringiensis* isolates were not significant. The application of *B. thuringiensis* improved foliage protection by 15 to 25% compared with untreated checks. Journal of economic entomology. June 1988. v. 81 (3). p. 880-886. maps. Includes references. (NAL Call No.: DNAL 421 J822).

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**Comparison of vegetation patterns resulting from bulldozing and two-way chaining on a Utah pinyon-juniper big game range.**

GRBNA. Skousen, J. Davis, J.N.; Brotherson, J.D. Provo : Brigham Young University. The Great Basin naturalist. July 31, 1986. v. 46 (3). p. 508-512. Includes references. (NAL Call No.: DNAL 410 G79).

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**Compartmentalization of decay in trees.**

SCAMA. Shigo, A.L. New York, N.Y. : Scientific American, Inc. Scientific American. Apr 1985. v. 252 (4). p. 96-103. ill. (NAL Call No.: DNAL 470 SCI25).

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**Competing vegetation affects yield of southern pines.**

HARAA. Glover, G.R. Creighton, J.L. Auburn, Ala. : The Station. Highlights of agricultural research - Alabama Agricultural Experiment Station. Fall 1986. v. 33 (3). p. 13. ill. (NAL Call No.: DNAL 100 AL1H).

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**Competition effects in hardwood stands.**

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MUCBA. Gage, S.H. Simmons, G.A.; Parks, B.D. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 52-58. maps. Includes references. (NAL Call No.: DNAL 275.29 M58B).

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**Computer prediction of insecticide efficacy for western spruce budworm and Douglas-fir Tussock moth susceptible, tolerant, resistant**

/Jacqueline L. Robertson, Molly W. Stock. --. Robertson, Jacqueline L. Stock, Molly W. Berkeley, Calif. : USDA, Forest Service, Pacific Southwest Forest and Range Experiment Station, 1986. Cover title. ~ "April 1986" -- p. 2 of cover. i, 11 p. : ill. ; 28 cm. --. Bibliography: p. 11. (NAL Call No.: DNAL aSD11.A325 no.89).

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Stark, R.W. Waters, W.E. New York : Wiley, c1985. Integrated pest management in pine-bark beetle ecosystems / edited by William E. Waters, Ronald W. Stark, David L. Wood. p. 49-60. ill. (NAL Call No.: DNAL SB608.P65I58).

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XGTIA. McGregor, M.D. Ogden, Utah : The Station. USDA Forest Service general technical report INT- Inter Mountain Forest and Range Experiment Station. Apr 1985. (174). p. 30-31. (NAL Call No.: DNAL aSD11.A48).

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**A conducive day concept to explain the effect of low temperature on the development of scleroderis shoot blight.**

PHYTA. Marosy, M. Patton, R.F.; Upper, C.D. St. Paul, Minn. : American Phytopathological Society. The in vitro growth of *Gremmeniella abietina* at -6 C both in the presence or absence of ice crystals was confirmed. Red pine seedlings artificially inoculated with the North American serotype, exposed to natural field conditions and artificially manipulated field conditions, developed symptoms of *Scleroderis* shoot blight when exposed to 44 or more days in which the temperature remained between -6 and +5 C or snow completely covered the seedlings or tree parts--a conducive day. Thus, an extended period of relatively mild canopy temperature during the winter appears to favor disease development. The conducive period--a period in which 44 or more conducive days occurred--could either occur in the winter after inoculation, or over the two winters after inoculation. The apparent latent period in the disease cycle may result from the need for winter conditions before symptom development can occur. The occurrence of symptoms primarily on lower branches, and the restriction of the disease to latitudes that receive sustained snow cover in the Lake States are consistent with this observation. Comparison of literature descriptions of outbreaks of the disease to weather records



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revealed a strong association between conducive periods, usually single conducive winters, and the occurrence of symptoms. The natural range of the disease may be restricted by the need for recurrence of conducive periods within 3 yr to avoid breaking the disease cycle.

Phytopathology. Nov 1989. v. 79 (11). p. 1293-1301. Includes references. (NAL Call No.: DNAL 464.8 P56).

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JEENAI. Gray, D.R. Borden, J.H. Lanham, Md. : Entomological Society of America. Attack intensification within mountain pine beetle, *Dendroctonus ponderosae* Hopkins, infestations in five stands of lodgepole pine, *Pinus contorta* var. *latifolia* Englemann, was compared within a central zone (A) and two concentric, surrounding zones (B and C) that were 50 and 100-m wide, respectively. When trees in Zone A were baited at 50-m centers with semiochemicals (trans-verbenol, exo-brevicomin, and myrcene), ratios of newly attacked (green) trees to previously attacked (red) trees were greater in

Zone A than the outer zones in two of three stands, indicating successful containment and concentration of these infestations. In two control stands in which Zone A was unbaited, the green/red ratios were higher in Zone B than in the other two zones, indicating an outward spread of the infestation. Baiting of trees caused an increase in attack density in Zone A. Attack density and diameter were positively correlated for all sites. Incorporating attack density and tree diameter into a weighted green/red ratio or an attack intensification ratio amplified the results obtained by calculating unweighted green/red ratios, and indicated containment and concentration in the third experimental stand. These results confirm that tree baiting is an effective method of containing and concentrating mountain pine beetle infestations. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1399-1405. Includes references. (NAL Call No.: DNAL 421 J822).

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**Defensive responses of trees in relation to their carbon/nutrient balance.**

Tuomi, J. Niemela, P.; Chapin, F.S. III; Bryant, J.P.; Siren, S. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 57-72. Includes references. (NAL Call No.: DNAL SB761.M46).

3672

**Defensive strategies of woody plants against different insect-feeding guilds in relation to plant ecological strategies and intimacy of association with insects.**

Mattson, W.J. Lawrence, R.K.; Haack, R.A.; Herms, D.A.; Charles, P.J. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 3-38. ill. Includes references. (NAL Call No.: DNAL SB761.M46).

3673

**Defoliation survey.**

MUCBA. Sapio, F.J. Priest, R.J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 2-3. maps. (NAL Call No.: DNAL 275.29 M58B).



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3674

**Degradation and metabolism of mexacarbate in two types of forest litters under laboratory conditions.**

JPFCD2. Sundaram, K.M.S. Boyonoski, N.; Feng, C. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1987. v. 22 (1). p. 29-54. Includes references. (NAL Call No.: DNAL TD172.U61).

3675

**Degradative pathways of lignin model compounds.**

Higuchi, T. Orlando, Fla. : Academic Press, c1985. Biosynthesis and biodegradation of wood components / edited by Takayoshi Higuchi. Literature review. p. 557-578. Includes references. (NAL Call No.: DNAL TS932.B56).

3676

**A degree-day model to predict Nantucket pine tip moth, *Rhyacionia frustrana* (Comstock) (Lepidoptera: Tortricidae), flights in southern California.**

EVETEX. Malinoski, M.K. Paine, T.D. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1988. v. 17 (1). p. 75-79. maps. Includes references. (NAL Call No.: DNAL QL461.E532).

3677

**Degree growth stage model and rest-breaking mechanisms in temperate woody perennials.**

HJHSA. Fuchigami, L.H. Nee, C.C. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Mechanisms of Rest and Dormancy of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 12, 1986, Davis, California.~ Literature review. Oct 1987. v. 22 (5). p. 836-845. ill. Includes references. (NAL Call No.: DNAL SB1.H6).

3678

**The Delphi approach to the mediation of environmental disputes.**

EMNGD. Miller, A. Cuff, W. New York : Springer International. Environmental management. May 1986. v. 10 (3). p. 321-330. Includes references. (NAL Call No.: DNAL HC79.E5E5).

3679

**Demonstrating effective management measures for southern pine beetle in Virginia.**

XFGSA. Morris, C.L. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 64-66.

Includes references. (NAL Call No.: DNAL aSD433.A53).

3680

**Demonstrating integrated pest management on National Forests in South Carolina and Georgia.**

XFGSA. Hoffard, W.H. Oak, S.W. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 35-44. ill., maps. Includes references. (NAL Call No.: DNAL aSD433.A53).

3681

**Demonstrating the efficacy of thinning for reducing southern pine Beetle impacts in North Carolina.**

XFGSA. Doggett, C. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 31-34. maps. Includes references. (NAL Call No.: DNAL aSD433.A53).

3682

**Demonstration of the effectiveness of basal area cutting to reduce tree killing by the mountain pine beetle in ponderosa pine, Crow and Northern Cheyenne Indian Reservations, Montana, 1984: establishment report.**

Gibson, K.E. McGregor, M.D.; Amman, G.D. Missoula, Mont. : The Region. Report - USDA Forest Service, Northern Region. Mar 1985. (85-8). 9 p. maps. Includes references. (NAL Call No.: DNAL aSD11.U585).

3683

**A *Dendroctonus frontalis* infestation growth model: organization, refinement, and utilization.**

Stephen, F.M. Lih, M.P. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 186-194. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

3684

**Dendroecological analysis of a population of black gum (*Nyssa sylvatica* Marsh.) in southern Ontario, Canada.**

McCaw, P.E. Eckenwalder, J.E. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 70-78. Includes

references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

3685

**Densitometric and ring width analysis of 3-year-old Pinus taeda L. and Liquidambar styraciflua L. grown under three levels of CO2 and two water regimes.**

Telewski, F.W. Strain, B.R. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 494-500. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

3686

**Density-damage relationship and presence-absence sampling of the elm leaf beetle (Coleoptera: Chrysomelidae) in northern California.**

EVETEX. Dreistadt, S.H. Dahlsten, D.L. Lanham, Md. : Entomological Society of America. The relationship between density of elm leaf beetle, *Xanthogaleruca luteola* (Muller), and damage to English elm, *Ulmus procera* Salisbury, and Siberian elm, *Ulmus pumila* L., was studied in seven northern California cities in 1986 and 1987. Peak first-generation elm leaf beetle egg or larval densities were good predictors of cumulative foliage damage to English elm and to a lesser extent predicted Siberian elm damage. Egg density on both hosts was highly associated with the proportion of samples infested with eggs. The maximum proportion of presence-absence samples infested with first generation eggs predicted cumulative damage to English but not to Siberian elm. When no effort was made to control beetle populations most English elm trees sustained more than 40% damage to retained foliage, whereas damage to most Siberian elms was less. *Environmental entomology*. Oct 1989. v. 18 (5). p. 849-853. Includes references. (NAL Call No.: DNAL QL461.E532).

3687

**Deposition of hexazinone from a logarithmic sprayer.**

JPFCD2. Feng, J.C. Ehrentraut, G.B.; Drew, T.J. New York, N.Y. : Marcel Dekker. *Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes*. Oct 1989. v. 24 (5). p. 525-537. Includes references. (NAL Call No.: DNAL TD172.J61).

3688

**Description of host species.**

XATBA. Hermann, R.K. Washington, D.C. : The Department. Technical bulletin - United States Dept. of Agriculture. In the series analytic: Western Spruce Budworm / Martha H. Brooks... et.al. May 1987. (1694). p. 43-56. ill. (NAL Call No.: DNAL 1 AG84TE).

3689

**Design efficiencies with planned and unplanned unbalance for estimating heritability in forestry.**

FOSCA. McCutchan, B.G. Namkoong, G.; Giesbrecht, F.G. Bethesda, Md. : Society of American Foresters. Design efficiencies are evaluated for the estimation of heritability in unbalanced designs using Modified Maximum Likelihood estimation. Assuming knowledge of the variance components, the variance of the estimate of heritability is calculated. The effects of block size, plot size, family size, variance of family size, and total number of observations on design efficiency are examined across the range of heritability and under 100%, 90%, 80%, and 60% survival. The implications of each of these design factors are discussed. There is no uniformly best design for estimating heritability; the most efficient design is a function of the heritability. *Forest science*. Sept 1989. v. 35 (3). p. 801-815. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3690

**Deterioration of black spruce seed during in-situ storage and processing.**

TPLNA. Skeates, D.A. Irving, D.E.; Haavisto, V.F. Washington, D.C. : The Service. *Tree planters' notes - U.S. Department of Agriculture, Forest Service*. Summer 1989. v. 40 (3). p. 5-8. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

3691

**Determination of persistence, movement, and degradation of hexazinone in selected Canadian boreal forest soils.**

JAFCAU. Roy, D.N. Konar, S.K.; Charles, D.A.; Feng, J.C.; Prasad, R.; Campbell, R.A. Washington, D.C. : American Chemical Society. *Journal of agricultural and food chemistry*. Mar/Apr 1989. 37 (2). p. 443-447. Includes references. (NAL Call No.: DNAL 381 J8223).



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3692

**Determining the amount of triclopyr required to control ash and birch with basal bark application.**

PNWSB. Kuhns, L.U. Lyman, G.T. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. 62-63. (NAL Call No.: DNAL 79.9 N814).

3693

**Determining the effects of fusiform rust on forest productivity.**

Froelich, R.C. Bethesda, Md. : The Society. Proceedings of the... Society of American Foresters National Convention. "Economic and Social Development : A Role for Forests and Forestry Professionals," October 18-21, 1987, Minneapolis, Minnesota. 1988. p. 68-71. Includes references. (NAL Call No.: DNAL SD143.S64).

3694

**Developing weed control systems for conifer seedlings.**

WSWPA. Agamalian, H.S. Reno : The Society. Proceedings - Western Society of Weed Science. 1985. v. 38. p. 164-166. (NAL Call No.: DNAL 79.9 W52).

3695

**Development and implementation of a gypsy moth integrated pest management program.**

JOARD. Reardon, R. McManus, M.; Kolodny-Hirsch, D.; Tichenor, R.; Raupp, M.; Schwalbe, C.; Webb, R.; Meckley, P. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Literature review. Sept 1987. v. 13 (9). p. 209-216. ill., maps. Includes references. (NAL Call No.: DNAL SB436.J6).

3696

**Development and implementation of the southern pine beetle decision support system.**

Saunders, M.C. Loh, P.K.; Coulson, R.N.; Rykiel, E.J.; Payne, T.L.; Pulley, P.E.; Hu, L.C. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 335-363. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

3697

**Development and mortality of *Ips avulsus* (Coleoptera: Scolytidae) at constant temperatures.**

EVETEX. Wagner, T.L. Hennier, P.B.; Flamm, R.O.; Coulson, R.N. College Park, Md. : Entomological Society of America. Aspects of the development and mortality of *Ips avulsus* (Eichhoff) were studied at seven constant temperatures from 10 to 35 degrees C. On average, eggs occupied 10.3% of the total time in the host, larvae 34.8%, pupae 11.8%, and teneral adults 43.1%. Plots of development rates (reciprocal of median times) and percent mortalities versus constant temperatures indicated that the insect is well adapted to high temperatures but sensitive to low temperatures. The timing of oviposition relative to sibling oviposition time in a slab had little effect on the development times of any life stage or the life cycle. Oviposition time influenced life-stage and life-cycle mortality, although the effects were not great. For example, the probability of larval death increased from 16.6 to 28.7% for individuals originating in the first and fourth quarters of the oviposition period. The probability of death due to cannibalism was less than 10% and was not influenced by oviposition time. No difference was observed in the overall proportion of males to total emerging beetles (0.496 and 0.5; however, this proportion increased with time throughout the emergence period. Models were developed to predict life-stage and life-cycle development times as functions of temperature. A mechanistic model described the development rate versus constant temperature relationship, whereas a cumulative Weibull function described the temperature-independent distributions of normalized development times. The life-cycle model was validated using a multiple-cohort simulation procedure and data of *I. avulsus* emergence from three trees in each of three field plots. The validation indicated model suitability in a larger model of population dynamics, although additional testing is indicated. Environmental entomology. Apr 1988. v. 17 (2). p. 181-191. Includes references. (NAL Call No.: DNAL QL461.E532).

3698

**Development and mortality of *Ips calligraphus* (Coleoptera: Scolytidae) at constant temperatures.**

EVETEX. Wagner, T.L. Fargo, W.S.; Flamm, R.O.; Coulson, R.N.; Pulley, P.E. Lanham, Md. : Entomological Society of America. We describe effects of constant temperature, beetle density, and time of oviposition on aspects of development, mortality, sex ratio, and size of *Ips calligraphus* (Germar). Emphasis is placed on individual life stages. Relationships of median development times to constant temperatures were similar for eggs, larvae, and pupae in the 12.5-37.5 degrees C range. These relationships appeared as backward J-shaped curves. Reciprocal development times versus temperatures for these life stages were described by the six-parameter rate function of

Sharpe & DeMichele (1977, J. Theor. Biol. 64: 649-670). Development times and foraging distances of larvae increased with each instar. The third instar required 61% of total larval time and excavated 73% of the total larval gallery. Optimum development temperature of teneral adults was not identified, indicating greater tolerance to high temperatures of this stage compared with the others. The four-parameter Sharpe & DeMichele (1977) model (without high-temperature inhibition) described teneral adult rate as a function of temperature. Timing of oviposition influenced development time of larvae (increased development time with late oviposition) and teneral adults (decreased), but not development times of eggs or pupae. Reversed patterns of longer development times for larvae and shorter times for teneral adults canceled any effects of sequential oviposition on length of life cycle. Distributions of development times were generally skewed toward the longer times, and variation around mean time tended to increase with successive life stage. A single, temperature-independent distribution of normalized development times is presented for each life stage and is described by a three-parameter cumulative Weibull function. stage-specific mortality (resulting from unknown causes) formed partial or full U-shaped patterns when plotted against temperature. Density-dependent mortality resulting from cannibalism is discussed, with a Weibull function. Environmental entomology. Apr 1987. v. 16 (2). p. 484-496. Includes references. (NAL Call No.: DNAL QL461.E532).

3699

**Development, implementation, and validation of a large area hazard- and risk-rating system for southern pine beetle.**

Billings, R.F. Bryant, C.M.; Wilson, K.H. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 226-232. Includes references. (NAL Call No.: DNAL aSD11.U57).

3700

**The development of a computerized database management system for Midland County.**

MUCBA. Gage, S.H. Wirth, T.M. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 50-51. (NAL Call No.: DNAL 275.29 M58B).

3701

**Development of a herbicide data base for the Southeastern United States forestry sector.** SWSPB. Cantrell, R.L. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 257-262. Includes 4 references. (NAL Call No.: DNAL 79.9 S08).

3702

**Development of Ectomycorrhizae on container-grown European larch.**

TPUNA. Rietveld, W.J. Sharp, R.A.; Kienzler, M.F.; Dixon, R.K. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Spring 1989. v. 40 (2). p. 12-17. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

3703

**The development of old-growth douglas-fir forests northeast of Mount St. Helens, Washington, following an A.D. 1480 eruption.**

Yamaguchi, D.K. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 181-185. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

3704

**Development of the abscission zone in needles of Douglas-fir.**

JDSHB. Montano, J.M. Proebsting, W.M. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Includes cut trees. Jan 1988. v. 113 (1). p. 133-137. Includes references. (NAL Call No.: DNAL 81 S012).

3705

**Development of wound tissue in the bark of Fraser fir and its relation to injury by the balsam woolly adelgid.**

GENSAB. Arthur, F.H. Hain, F.P. Athens, Ga. : The Society. Journal of Entomological Science. Jan 1985. v. 20 (1). p. 129-135. Includes references. (NAL Call No.: DNAL QL461.G4).



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3706

**Development, reproduction, and competitive interactions between two sympatric leafhopper species (Homoptera: Cicadellidae) on redbud trees.**

EVETEX. Hunter, C.E. Yeangan, K.V. Lanham, Md. : Entomological Society of America. The developmental and reproductive biologies of two sympatric leafhoppers, *Erythroneura aclys* McAtee and *Erythroneura bistrata* McAtee were studied, as well as their responses to intra- and interspecific competition. Both leafhoppers specialize on redbud trees, *Cercis canadensis* L. *E. aclys* eggs developed faster in the field than *E. bistrata* eggs in 1985 but not in 1986; developmental periods for nymphs in the field did not differ significantly between species in either year. Under controlled but fluctuating warm temperatures (19-29 degrees C; average = 24 degree C), egg developmental periods did not differ significantly between species, but nymphal *E. aclys* developed faster than nymphal *E. bistrata*. Under controlled, cool fluctuating temperatures (11-21 degrees C; average = 16 degrees C), eggs and nymphs of *E. aclys* developed more quickly than those of *E. bistrata*. *E. aclys* and *E. bistrata* did not have statistically different pre-ovipositional periods, ovipositional periods, fecundities, or average daily ovipositional rates. Pre-ovipositional periods were longer in the first generation for both species. Both species exhibited a similar significant density-dependent response in a competition study. Fewer progeny were produced per female as density in a cage increased. There were no differences between species in the number of progeny produced whether caged as mixed or single species. Interspecific competition did not affect either species to a greater degree than did intraspecific competition. Shorter developmental requirements of *E. aclys* and its early-season ovipositional pattern may maintain this species as the numerically dominant of the two *Erythroneura* species at the primary study site on the University of Kentucky campus. Environmental entomology. Feb 1989. v. 18. p. 127-132. Includes references. (NAL Call No.: DNAL QL461.E532).

3707

**Developmental differences among five lodgepole pine provenances planted on a subalpine site in Montana.**

XFIPA. Cole, D.M. Ogden, Utah : The Station. Research paper INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Nov 1989. (415). 11 p. Includes references. (NAL Call No.: DNAL A99.9 F764U).

3708

**Developments in commercially produced microbials at Biochem Products.**

XGNEA. Lublinkhof, J. Ross, D.H. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 137. (NAL Call No.: DNAL aSD11.U56).

3709

**Dicamba products and their uses in forest management.**

SWSPB. Crowley, R.H. Newbold, R.A. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 140-145. Includes 1 references. (NAL Call No.: DNAL 79.9 S08).

3710

**Dieback and declines of urban trees.**

JDARD. Houston, D.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Mar 1985. v. 11 (3). p. 65-72. ill. Includes references. (NAL Call No.: DNAL SB436.U6).

3711

**Differences in growth rate and in acceleration of growth rate among loblolly pine rangewide seed sources confirmed.**

Kung, F.H. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 407-414. Includes references. (NAL Call No.: DNAL A99.9 F769).

3712

**Differential susceptibility of *Toumeyella pinii* (King) (Homoptera: Coccidae) to pyrethroid and organophosphate insecticides: a factor in outbreaks in southern pine seed orchards.**

JEENAI. Clarke, S.R. Debarr, G.L.; Berisford, C.W. College Park, Md. : Entomological Society of America. Contact toxicities of nine insecticides (four organophosphorous insecticides and five pyrethroids) were tested on crawlers of a striped pine scale, *Toumeyella pinii* (King). Organophosphorous insecticides were more toxic than pyrethroids. Chlorpyrifos was the most toxic, and fenvalerate was the least toxic. Residual tests showed that the pyrethroid esfenvalerate lost its toxic effects at a slightly faster rate than the organophosphorous insecticide azinphos-methyl. Low toxicity of the pyrethroids to crawlers may

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be partially responsible for the rapid build-up of *T. pini* in southern pine seed orchards. *Journal of economic entomology*. Oct 1988. v. 81 (5). p. 1443-1445. Includes references. (NAL Call No.: DNAL 421 J822).

3713

### **Differential thermal analysis of Black Oak acorns.**

Boese, S.R. George, M.F. Columbia, Mo. : The Interdisciplinary Plant Biochemistry and Physiology Program. Current topics in plant biochemistry and physiology : Proceedings of the ... Plant Biochemistry and Physiology Symposium held at the University of Missouri, Columbia. 1985. v. 4. p. 231. Includes 4 references. (NAL Call No.: DNAL QK861.P55).

3714

### **Diphenylether herbicides in southern pine nurseries.**

South, D.B. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 441-453. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

3715

### **Diplodia tip blight or dieback of pines.**

MUCBA. Adams, G. Bessette, P. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In subseries: Woody Ornamental Tips. May 1988. (2112). 7 p. ill. (NAL Call No.: DNAL 275.29 M58B).

3716

### **Direct control of insect defoliation in oak stands is economically feasible in preventing timber value loss.**

XFGTA. Hicks, R.R. Jr. Riddle, K.S.; Brock, S.M. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 86-94. maps. Includes references. (NAL Call No.: DNAL aSD11.A352).

3717

### **Disease of forest trees.**

Alexander, S.A. Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. In the series analytic: 1988-89 pest management guide for

forest, Christmas tree, aquatic, right-of-way and non-crop areas / coordinator: J.M. Luna. Jan 1988. (456-011,rev.). p. 5-7. (NAL Call No.: DNAL S544.3.V8V52).

3718

### **Diseases of Christmas trees.**

Alexander, S.A. Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. In the series analytic: 1988-89 pest management guide for forest, Christmas tree, aquatic, right-of-way and non-crop areas / coordinator: J.M. Luna. Jan 1988. (456-011,rev.). p. 13. (NAL Call No.: DNAL S544.3.V8V52).

3719

### **Diseases of conifer seedlings caused by seed-borne Fusarium species.**

XGTIA. James, R.L. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Paper presented at the "Conifer Tree Seed in the Inland Mountain West Symposium," August 5-6, 1985, Missoula, Montana. - Literature review. Apr 1986. (203). p. 267-271. Includes references. (NAL Call No.: DNAL aSD11.A48).

3720

### **Diseases of eastern white pine.**

GTRWD. Hodges, C.S. Washington, D.C. : The Service. General technical report WD - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 93-98. Includes references. (NAL Call No.: DNAL aSD11.U52).

3721

### **Diseases of landscape trees.**

Stipes, R.J. Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. In the series analytic: 1988-89 pest management guide for home ornamental plants / coordinated by J.M. Luna. Jan 1988. (456-004,rev.). p. 53-57. (NAL Call No.: DNAL S544.3.V8V52).

3722

### **Diseases of trees and shrubs /by Wayne A. Sinclair, Howard H. Lyon, and Warren T. Johnson.**

Sinclair, Wayne A., 1936-. Lyon, Howard H.; Johnson, Warren T. Ithaca, N.Y. : Comstock Pub. Associates, 1987. Includes index. 574 p. : col.



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ill. ; 31 cm. Bibliography: p. 512-546. (NAL Call No.: DNAL SB762.S56).

3723

### **Dispersal of second-instar western spruce budworm above and below forest canopies in western Montana.**

XFINA. Carlson, C.E. McCarthy, G.J. Ogden, Utah : The Station. Research note INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. June 1989. (388). 6 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764UN).

3724

### **Distribution and abundance of early instar gypsy moth (Lepidoptera: Lymantriidae) in forests during day and night.**

EVETEX. Ticehurst, M. Yendo, W. Lanham, Md. : Entomological Society of America. Studies were conducted to determine the distribution and abundance of early instar gypsy moth, *Lymantria dispar* (L.), within canopies of codominant *Quercus rubra* L., *Q. alba* L., and *Q. prinus* L. in moderate and dense populations during the day; and to compare the distribution and abundance of early instar gypsy moth within canopies of *Q. rubra* trees, saplings, and seedlings, and saplings of witch hazel, *Hamamelis virginiana* L., during day and night in a moderate population. Most larvae were observed in the lower canopy of codominant trees in all sites during the day. Variation associated with tree species was not significant at any site. Larval abundance was highly correlated,  $r(2) = 0.992$ , with preseason egg mass density. No differences in larval abundance or distribution were detected during day and night. More than 80% of all larvae were observed in the lower canopy, understory, and forest floor day and night. The most larvae per 1,000 leaves were detected on seedlings and the least in the upper canopy of codominant trees. The target for the aerial application of insecticides and release of parasitoids occupies a lower vertical position in the forest than was previously thought. *Environmental entomology*. June 1989. v. 18 (3). p. 459-464. Includes references. (NAL Call No.: DNAL QL461.E532).

3725

### **Distribution and characteristics of windthrow microtopography on the Cumberland Plateau of Kentucky.**

SSSJD4. Cremeans, D.W. Kalisz, P.J. Madison, Wis. : The Society. The abundance and characteristics of microtopography resulting from the uprooting of trees were examined on five landtypes on the northern Cumberland Plateau. Plots, 10 m by 25 m, were established at 180 locations on randomly-oriented systematic grids located in 12 first-order watersheds. The area and depth of soil disturbed were measured for each of the 524

uprootings encountered. In addition, all windthrow microtopography in a single representative hollow, 11.3 ha in area, was mapped and measured. Soil disturbance by uprooting was least on ridges, intermediate on side slopes, and greatest in coves and on lower north slopes. Percentage disturbance of the ground surface ranged from 0.4% on ridges to 2.4% in coves; number and mean area disturbed by individual uprootings ranged from 50 to 112 ha<sup>-1</sup>, and from 0.5 to 2.1 m<sup>2</sup> along the ridge-to-cove gradient. The lower abundance of windthrow microtopography on ridges was attributed to a relatively high incidence of stem breakage vs. uprooting. Stem breakage seemed particularly common in scarlet oak (*Quercus coccinea* Muenchh.) which dominated ridges and south slopes. Observations made during the course of this study also suggested that concentrated subsurface water flow and concomitant decreases in tree stability may contribute to uprooting in coves and on lower slopes. Windthrow, viewed as a pedogenic process, clearly does not operate uniformly over this mountainous landscape. *Soil Science Society of America journal*. May/June 1988. v. 52 (3). p. 816-821. maps. Includes references. (NAL Call No.: DNAL 56.9 S03).

3726

### **Distribution and dynamics of aphid (Homoptera: Drepanosiphidae) populations on *Betula pendula* in northern California.**

HILGA. Hajek, A.E. Dahlsten, D.L. Berkeley, Calif. : California Agricultural Experiment Station. *Hilgardia : a journal of agricultural science*. Feb 1988. v. 56 (1). p. 1-33. (NAL Call No.: DNAL 100 C12H).

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### **Distribution and habitats of the formosan subterranean termite (Isoptera: Rhinotermitidae) in South Carolina.**

JEENAI. Chambers, D.M. Zungoli, P.A.; Hill, H.S. Jr. Lanham, Md. : Entomological Society of America. *Journal of economic entomology*. Dec 1988. v. 81 (6). p. 1611-1619. Includes references. (NAL Call No.: DNAL 421 J822).

3728

### **Distribution and persistence of carbaryl in some terrestrial and aquatic components of a forest environment.**

JPFC2. Sundaram, K.M.S. Szeto, S.Y. New York, N.Y. : Marcel Dekker. *Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes*. 1987. v. B22 (5). p. 579-599. maps. Includes references. (NAL Call No.: DNAL TD172.J61).



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**Distribution and persistence of trichlorfon in a forest environment.**

JPFCD2. Sundaram, K.M.S. Varty, I.W. New York, N.Y. : Marcel Dekker. Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes. 1989. v. 24 (6). p. 647-659. Includes references. (NAL Call No.: DNAL TD172.J61).

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**Distribution of arsenic in lodgepole pines treated with MSMA.**

Maclauchlan, L.E. Borden, J.H.; D'Auria, J.M. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Apr 1988. v. 3 (2). p. 37-40. Includes references. (NAL Call No.: DNAL SD388.W6).

3731

**Distribution of arsenic in MSMA-treated lodgepole pines infested by the mountain pine beetle, *Dendroctonus ponderosae* (Coleoptera: Scolytidae), and its relationship to beetle mortality.**

JEENAI. Maclauchlan, L.E. Borden, J.H.; D'Auria, J.M.; Wheeler, L.A. Lanham, Md. : Entomological Society of America. The LC50 of MSMA (monosodium methanearsonate) for first- and second-instar mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins, mining for 4 d in ground phloem tissue impregnated with methane arsonic acid, the pure form of arsenic in MSMA, was 102 ppm. Application of MSMA 3 wk after attack to axe-frills (cuts) near the root collar of five lodgepole pines, *Pinus contorta* var. *latifolia* Engelman, resulted in high accumulations of arsenic in phloem and sapwood near the point of application and in foliage 11 wk later. MPB taken from bolts cut from MSMA-treated trees 1 m above the axe-frill were all dead. There was a strong relationship between amounts of arsenic in MPB and those in phloem tissue up to 2 m. At sampling points above 2 m on treated trees, arsenic residues in phloem and sapwood were, on average, not significantly different from those occurring naturally in tissues of lodgepole pine. Enough arsenic could have passed through the tissues to kill or inhibit the brood MPB within the trees, but MPB mortality was probably due to an interaction of many factors including moisture deficit and fungal invasion of the host tree. Journal of economic entomology. Feb 1988. v. 81 (1). p. 274-280. ill. Includes references. (NAL Call No.: DNAL 421 J822).

3732

**Distribution of blank hexazinone granules from aerial and ground applicators.**

WETEE9. Feng, J.C. Sidhu, S.S. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr/June 1989. v. 3 (2). p. 275-281. Includes

references. (NAL Call No.: DNAL SB610.W39).

3733

**The distribution of cell wall deformations in fibres adjacent to rays in *Eucalyptus pilularis*.**

WOSTBE. Wilkins, A.P. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1986. v. 20 (3). p. 229-233. Includes references. (NAL Call No.: DNAL SD433.A1W6).

3734

**Distribution of endogenous indole-3-acetic acid and compression wood formation in reoriented branches of Douglas-fir.**

PLPHA. Wilson, B.F. Chien, C.T.; Zaerr, J.B. Rockville, Md. : American Society of Plant Physiologists. Five-year-old segments of intact 7-year-old branches of Douglas-fir (*Pseudotsuga mezesii* Mirb. Franco) were reoriented to determine the relations between indole-3-acetic acid (IAA) and the formation of compression wood. Eight branches per treatment were either left at their original angle (mean of 69 degrees, the control), or bent proximal to the segment to reorient it up or down 30 degrees. Differentiating xylem tissue from the upper and lower sides of each segment was collected and extracted separately for IAA analysis by in-line fluorescence detection of free IAA and IAA methyl ester after sequential C18 reversed-phase high performance liquid chromatography. The IAA methyl ester was confirmed by gas chromatography-mass spectroscopy. Compression wood formed on the upper side of branches reoriented up and on the lower side of controls or branches reoriented down. IAA was present in all samples. The difference in IAA concentration between upper and lower sides was either not correlated, or negatively correlated in segments reoriented down, with both the occurrence of compression wood and the rate of new tracheid production. Mean concentrations for whole branch segments were not affected by the treatments regardless, of whether IAA concentrations were expressed on a surface area, weight, or cell basis. Plant physiology. Sept 1989. v. 91 (1). p. 338-344. ill. Includes references. (NAL Call No.: DNAL 450 P692).

3735

**Distribution of magnesium between chlorophyll and other photosynthetic functions in magnesium deficient "sun" and "shade" leaves of poplar.**

JPNUDS. Dorenstouter, H. Pieters, G.A.; Findenegg, G.R. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. 1985. v. 8 (12). p. 1089-1101. Includes references. (NAL Call No.: DNAL QK867.J67).



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**Distribution of photosynthetically fixed carbon within root systems of *Eucalyptus pilularis* plants ectomycorrhizal with *Pisolithus tinctorius*.**

NEPHA. Cairney, J.W.G. Ashford, A.E.; Allaway, W.G. New York, N.Y. : Cambridge University Press. The New phytologist. Aug 1989. v. 112 (4). p. 495-500. ill. Includes references. (NAL Call No.: DNAL 450 N42).

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**Distribution of tree species in north central Florida within a soil moisture and soil nutrient gradient.**

BUCA. Monk, C.D. Atlanta, Ga. : Georgia Academy of Science. Georgia journal of science. 1987. v. 45 (3). p. 119-133. Includes references. (NAL Call No.: DNAL Q11.G4).

3738

**Disturbance-mediated accelerated succession in two Michigan forest types.**

FOSCA. Abrams, M.D. Scott, M.L. Bethesda, Md. : Society of American Foresters. In northern lower Michigan, logging accelerated sugar maple (*Acer saccharum*) dominance in a northern white cedar (*Thuja occidentalis*) community, and clear-cutting and burning quickly converted certain sites dominated by mature jack pine (*Pinus banksiana*) to early-successional hardwoods, including *Prunus*, *Populus*, and *Quercus*. In both forest types the succeeding hardwoods should continue to increase in the future at the expense of the pioneer conifer species. In the cedar example, sugar maple was also increasing in an undisturbed, old-growth stand, but at a much reduced rate than in the logged stand. Traditionally, disturbance was thought to set back succession to some earlier stage. However, our study sites and at least several other North American forest communities exhibited accelerated succession following a wide range of disturbances, including logging, fire, ice storms, wind-throw, disease, insect attack, and herbicide spraying. Forest science. Mar 1989. v. 35 (1). p. 42-49. ill. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3739

**DNA methylation as a mechanism of transcriptional regulation in nonphotosynthetic plastids in plant cells.**

PNASA. Ngerprasisitsiri, J. Kobayashi, H.; Akazawa, T. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. July 1988. v. 85 (13). p. 4750-4754. ill. Includes references. (NAL Call No.: DNAL 500 N21P).

3740

**Do woody plants operate near the point of catastrophic xylem dysfunction caused by dynamic water stress?.**

PLPHA. Tyree, M.T. Sperry, J.S. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Nov 1988. v. 88 (3). p. 574-580. Includes references. (NAL Call No.: DNAL 450 P692).

3741

**Does foliage damage influence predation on the insect herbivores of birch?.**

ECOLA. Bergelson, J.M. Lawton, J.H. Tempe, Ariz. : Ecological Society of America. Ecology : a publication of the Ecological Society of America. Apr 1988. v. 69 (2). p. 434-445. ill. Includes references. (NAL Call No.: DNAL 410 EC7).

3742

**Does verbenone reduce mountain pine beetle attacks in susceptible stands of ponderosa pine?.**

XARRA. Bentz, B. Lister, C.K.; Schmid, J.M.; Mata, S.A.; Rasmussen, L.A.; Haneman, D. Fort Collins, Colo. : The Station. Research note RM - U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. Includes statistical data. Oct 1989. (495). 4 p. Includes references. (NAL Call No.: DNAL A99.9 F7632US).

3743

**Doing your homework: how to avoid the problem, the attorney and the courts.**

McDonald, J.E. S.l. : s.n. . Proceedings ... annual Forest Vegetation Management Conference. Meeting held November 1-2, 1984, Redding, California. Aug 1985. (6th). p. 49-55. (NAL Call No.: DNAL QH541.5.F6F67).

3744

**Don't move gypsy moth.**

Washington, D.C. : The Department. Program aid - United States Department of Agriculture. July 1985. (1329, slightly rev.). 11 p. ill., maps. (NAL Call No.: DNAL 1 AG84PRO).

3745

**Dormancy, chilling requirements, and storability of container-grown loblolly pine seedlings.**

Boyer, J.N. South, D.B. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery,

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Alabama, August 4-9, 1985 / edited by David B. South. p. 372-383. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

3746

**Dormant and growing-season control of hardwoods using "streamline" basal application.**

SWSPBE. Burch, P.L. Hendler, R.J.; Kidd, F.A. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 234-243. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

3747

**Douglas-fir seed treatments: effects on seed germination and seedborne organisms.**

Dumroese, R.K. James, R.L.; Wenny, D.L.; Gilligan, C.J. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 155-160. Includes references. (NAL Call No.: DNAL aSD11.A42).

3748

**The Douglas-fir tussock moth in the interior pacific northwest.**

Mason, R.R. Wickman, B.E. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 179-209. ill., maps. Includes references. (NAL Call No.: DNAL SB761.D96).

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**Douglas-fir tussock moth in the Western United States.**

Washington, D.C. : The Department. Program aid - United States Department of Agriculture. Dec 1987. (1401). 8 p. ill. (NAL Call No.: DNAL 1 AG84PR0).

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**Draft environmental impact statement, Custer National Forest noxious weed treatment program : Montana ... /Forest Service, USDA. --.**

Billings, Mont. : The Service, 1986. Shipping list no.: 86-259-P.~ "February 1986"--cover. v. 87 p. : maps ; 28 cm. Bibliography: p. 85-87. (NAL Call No.: DNAL aSB612.A14D7).

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**Draft environmental impact statement for the suppression of the Southern pine beetle, Southern region /U.S. Dept. of Agriculture, Forest Service, Southern Region ; responsible official: R. Max Peterson. --.**

Peterson, R. Max. Atlanta, Ga. : The Region, 1986. Title on spine: DEIS for the suppression of the SPB - Southern region.~ "July 1986"--cover. ca. 600 p. in various pagings : ill., maps ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL aSB945.S635D7).

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**Droplet deposit from aerial applications of different pesticide formulations.**

XGNEA. Sundaram, A. Sundaram, K.M.S.; Cadogan, B.L. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 121-126. Includes references. (NAL Call No.: DNAL aSD11.U56).

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**Drought tolerance of southwestern Oregon Douglas-fir.**

FOSCA. White, T.L. Bethesda, Md. : Society of American Foresters. Forest science. June 1987. v. 33 (2). p. 283-293. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**The Dutch elm disease.**

McDaniel, M.C. Jones, B.F.; Tainter, F.H. Little Rock, Ark. : The Service. Leaflet EL - Arkansas University, Cooperative Extension Service. Apr 1987. (467). 8 p. ill. (NAL Call No.: DNAL 275.29 AR4LE).

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**Dutch elm disease, a model tree disease for biological control.**

Scheffer, R.J. Strobel G.A. Boca Raton, Fla. : CRC Press, 1988. Biocontrol of plant diseases / editors, K.G. Mukerji, K.L. Garg. Literature review. v. 2 p. 103-119. ill., maps. Includes references. (NAL Call No.: DNAL SB732.6.B56).

3756

**Dutch elm disease and elm yellows in central New York.**

PLDIDE. Lanier, G.N. Schubert, D.C.; Manion, P.D. St. Paul, Minn. : American Phytopathological Society. Plant disease. Mar 1988. v. 72 (3). p. 189-194. ill., maps.



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Includes references. (NAL Call No.: DNAL 1.9 P69P).

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### **Dwarf mistletoe as a host for brown felt blight in California.**

PLDRA. Scharpf, R.F. St. Paul, Minn. : American Phytopathological Society. Plant disease. Aug 1986. v. 70 (8). p. 798-799. Includes 10 references. (NAL Call No.: DNAL 1.9 P69P).

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### **Dwarf mistletoe laying seige to pines.**

Hemple, K. Fort Collins, Colo. : The Service. Forestry research west - U.S. Department of Agriculture, Forest Service. Nov 1988. p. 1-6. ill. (NAL Call No.: DNAL aSD11.F6).

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### **A dwarf mistletoe program for the Flathead Indian Reservation, Montana.**

Reedy, T. Becker, R.; Dooling, O.; Byler, J. Missoula, Mont. : The Division. Report - USDA Forest Service, Northern Region, State and Private Forestry. Jan 1986. (86-3). 8 p. Includes references. (NAL Call No.: DNAL aSD11.U585).

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### **Dwarf mistletoe program planning for the Rocky Mountain Region--1987-1991.**

Johnson, D.W. Denver : The Service. Technical report R2 - United States Forest Service, Forest Pest Management. Feb 1987. (38). 6 p. (NAL Call No.: DNAL aSD11.A422).

3761

### **Dynamics of establishment, growth, and development of black willow and cottonwood in the San Antonio River forest.**

TJSCA. Van Auken, O.W. Lubbock, Tex. : Texas Academy of Science. The Texas journal of science. Aug 1988. v. 40 (3). p. 269-277. Includes references. (NAL Call No.: DNAL 470 T31).

3762

### **Dynamics of forest insect populations patterns, causes, implications /edited by Alan A. Berryman.**

Berryman, A. A. 1937-. New York : Plenum Press, c1988. xx, 603 p. : ill. ; 26 cm. Includes bibliographies and indexes. (NAL Call No.: DNAL SB761.D96).

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### **Early impact and control of aphid (Chaitophorus populicola Thomas) infestations on young cottonwood plantations in the Mississippi Delta.**

XFNSA. Solomon, J.D. New Orleans, La. : The Station. U.S. Forest Service research note SO - United States, Southern Forest Experiment Station. Aug 1986. (326). 4 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7628U).

3764

### **Ecological changes on campsites in the Eagle Cap Wilderness, 1979 to 1984.**

XFINA. Cole, D.N. Ogden, Utah : The Station. USDA Forest Service research note INT - United States Intermountain Forest and Range Experiment Station. July 1986. (368). 15 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764UN).

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### **Ecological observations in the dwarf cloud forest of the Luquillo Mountains in Puerto Rico.**

BTROA. Weaver, P.L. Medina, E.; Pool, D.; Dugger, K.; Gonzales-Liboy, J.; Cuevas, E. Fairfax, Va. : Association for Tropical Biology. Biotropica. Mar 1986. v. 18 (1). p. 79-85. Includes references. (NAL Call No.: DNAL QH301.B52).

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### **Ecologists' opportunity in Yellowstone's blaze.**

SCIEA. Lewin, R. Washington, D.C. : American Association for the Advancement of Science. Science. Sept 30, 1988. v. 241 (4874). p. 1762-1763. ill. (NAL Call No.: DNAL 470 SCI2).

3767

### **Economic analysis of the silvicultural effects of vegetation management at the stand and forest levels.**

Brodie, J.D. Kuch, P.J.; Row, C. New York, N.Y. : Wiley, c1987. Forest vegetation management for conifer production / edited by John D. Walstad and Peter J. Kuch. p. 365-395. Includes references. (NAL Call No.: DNAL SB608.C7F6).

3768

### **Economic effectiveness of operational therapeutic pruning for control of Dutch elm disease.**

JOARD. Baker, F.A. French, D.W. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Aug 1985. v. 11 (8). p. 247-249. Includes references. (NAL Call No.: DNAL SB436.J6).

3769

**Economics of brush control in loblolly pine plantations.**

SWSPBE. Kline, W.N. Kidd, F.A. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. 1986. (39th). p. 324-334. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**The economics of competition control for loblolly pine plantations.**

Clason, T.R. Atlanta, GA : USDA Forest Service, Southern Region, 1988. A Manual on ground applications of forestry herbicides / edited by James H. Miller, Robert J. Mitchell. p. 11/1-11/7. Includes references. (NAL Call No.: DNAL aSB951.4.M36).

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**Economics of dutch elm disease control: a model and case study.**

UFUSA. Baughman, M.J. Bethesda, Md. : Society of American Foresters. Journal of forestry. Sept 1985. v. 83 (9). p. 554-557. Includes references. (NAL Call No.: DNAL 99.8 F768).

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**Ecophysiology and water relations research in the pinyon-juniper vegetation type.**

XGTIA. Brown, R.W. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at a "Conference on Pinyon-Juniper," January 13-16, 1986, Reno, Nevada. Jan 1987. (215). p. 398-405. Includes references. (NAL Call No.: DNAL aSD11.A48).

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**Ecophysiology of urban trees and their management--the North American experience.**

HUHSA. Whitlow, T.H. Bassuk, N.L. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Woody Plants in the Urban Environment: Selection and Management of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 15, 1986, Davis, California.~ Literature review. June 1988. v. 23 (3). p. 542-546. Includes references. (NAL Call No.: DNAL SB1.H6).

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**Effect of a clay mineral (montmorillonite) on the nodulation of *Alnus* and on the nitrogenase activity of *Frankia* in pure culture.**

Smolander, A. Nurmiäho-Lassila, E.L.; Sundman, V. Philadelphia, Pa. : Balaban Publishers. Symbiosis. Paper presented at the "Symposium on Nitrogen Fixation and Symbiotic Systems," February 28-March 1, 1988, Jerusalem. 1988 v. 6 (1/2). p. 37-52. ill. Includes references. (NAL Call No.: DNAL QH548.S9).

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**Effect of a foliage disease caused by *Lirula abietis-concoloris* on growth of white fir in California.**

PLDRA. Scharpf, R.F. St. Paul, Minn. : American Phytopathological Society. Plant disease. Jan 1986. v. 70 (1). p. 13-14. ill. Includes 10 references. (NAL Call No.: DNAL 1.9 P69P).

3776

**Effect of aerial application of racemic disparlure on male trap catch and female mating success of gypsy moth (*Lepidoptera: Lymantriidae*).**

JEENAI. Webb, R.E. Tatman, K.M.; Leonhardt, B.A.; Plimmer, J.R.; Boyd, V.K.; Bystrak, P.G.; Schwalbe, C.P.; Douglass, L.W. Lanham, Md. : Entomological Society of America. Studies were conducted in Cecil County, Md., during the summer of 1980 using racemic disparlure to disrupt mating communication of the gypsy moth, *Lymantria dispar* (L.). A laminated plastic flake formulation of racemic disparlure was applied aerially at rates of 0, 7.5, 30, or 75 g (AI)/ha to replicated 16-ha forest plots. Significant decreases in male trap catch and in mating success for three different female types (lab females from a laboratory colony, wild females pupae obtained from the field, adults emerged in the laboratory, then replaced in the field, and natural females occurring naturally in the test plot) were observed with increasing disruptant dose. Although degree of mating success was highly correlated for all three female types, differences among female types in slope, intercept, and linear and quadratic relationships were observed. Generally, plots having higher populations (as measured by larval counts) among replicate plots for each dose also had increased mating for all female types. The flake formulation was easily applied and provided season-long mating disruption. Journal of economic entomology. Feb 1988. v. 81 (1). p. 268-273. Includes references. (NAL Call No.: DNAL 421 J822).



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3777

**Effect of aerial spraying with Dimilin, Dipel, or Gypchek on two natural enemies of the gypsy moth (Lepidoptera: Lymantriidae).**

JEENAI. Webb, R.E. Shapiro, M.; Podgwaite, J.D.; Reardon, R.C.; Tatman, K.M.; Venables, L.; Kolodny-Hirsch, D.M. Lanham, Md. : Entomological Society of America. The effects of three aerially applied insecticides on the incidence of two components of the natural enemy complex of the gypsy moth, *Lymantria dispar* (L.), were evaluated for the 1987 year of application. Application of Gypchek, a registered formulation of the gypsy moth nuclear polyhedrosis virus (NPV), initiated a large early-season (first-wave) epizootic of NPV; late-season NPV (second-wave) levels were higher in plots treated with Gypchek than in control plots, but not significantly so, whereas levels of the parasitoid *Cotesia melanoscela* (Ratzeburg) were significantly reduced in Gypchek-treated plots compared with control plots. Application of Dipel (*Bacillus thuringiensis* Berliner) resulted in a significant increase in numbers of *C. melanoscela*. Application of either Dipel or Dimilin (diflubenzuron) resulted in a significant decrease in incidence of NPV compared with control plots. Numbers of *C. melanoscela* in plots treated with Dimilin were not significantly different from those detected in control plots. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1695-1701. Includes references. (NAL Call No.: DNAL 421 J822).

3778

**Effect of application rate on droplet size spectra and deposit characteristics of Dimilin spray mixtures in an aerial spray trial.**

Sundaram, A. Retnakaran, A.; Raske, A.G.; West, R.J. Philadelphia, Pa. : ASTM, c1987. Pesticide formulations and application systems : seventh volume : a symposium sponsored by ASTM Committee E-35 on Pesticides, Phoenix, Ariz., 5-6 Nov. 1986 / G.B. Beestman and D.I.B. Vander Hooven, editors. p. 104-115. ill. Includes references. (NAL Call No.: DNAL SB950.93.P45).

3779

**The effect of blue oak removal on herbaceous production on a foothill site in the northern Sierra Nevada.**

XFGTB. Jansen, H.C. Berkeley, Calif. : The Station. USDA Forest Service general technical report PSW - United States, Pacific Southwest Forest and Range Experiment Station. Paper presented at the "Symposium on Multiple-Use Management of California's Hardwood Resources," November 12-14, 1986, San Luis Obispo, California. Nov 1987. (100). p. 343-350. Includes references. (NAL Call No.: DNAL aSD11.A325).

3780

**Effect of burlap bands on between-tree movement of late-instar gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae).**

EVETEX. Liebhold, A.M. Elkinton, J.S.; Wallner, W.E. College Park, Md. : Entomological Society of America. *Environmental entomology*. Apr 1986. v. 15 (2). p. 373-379. Includes references. (NAL Call No.: DNAL QL461.E532).

3781

**Effect of burning on hexazinone residues in firewood.**

SWSPBE. Bush, P.B. Neary, D.G.; McMahon, C.K.; Hendricks, H.L. Raleigh, N.C. : The Society. *Proceedings - Southern Weed Science Society*. 1986. (39th). p. 343-353. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

3782

**Effect of constant- and variable-humidity and temperature regimes on the survival and developmental periods of *Oligonychus ununguis* (Acarina: Tetranychidae) and *Neoseiulus fallacis* (Acarina: Phytoseiidae).**

EVETEX. Kramer, D.A. Hain, F.P. Lanham, Md. : Entomological Society of America. This study focused on the effects of constant- and variable-humidity and temperature regimes on the developmental periods of the spruce spider mite, *Oligonychus ununguis* (Jacobi), and a predator of this mite, *Neoseiulus fallacis* (Garman). Variable-humidity regimes, either alone or with variable-temperature regimes, had no significant effect on the developmental period of the immature stages of *O. ununguis*. Survival was marginally decreased under variable-temperature regimes. Temperature was the overriding influence for development of this mite. Developmental periods of *N. fallacis* immatures, however, were markedly increased by the use of a constant-humidity regime with a constant-temperature regime. In addition, survival of the immatures was low under low constant-humidity regimes. The effects of a range of constant-humidity regimes over a range of constant-temperature regimes on the survival and developmental period of *N. fallacis* eggs also were studied. Humidity was found to have a statistically significant but biologically trivial effect on the egg developmental period at the lower temperatures. However, when the vapor pressure deficit was high, there was a significant relationship between egg survival and vapor pressure deficit. The data suggest that the meteorological conditions in the field during the hot, dry summer months may not support a large population of *N. fallacis* and thereby allow *O. ununguis* populations to build up during these months. *Environmental entomology*. Oct 1989. v. 18 (5). p. 741-746. Includes references. (NAL Call No.: DNAL QL461.E532).

3783

**Effect of container type and watering regime on early growth of western larch seedlings.**

TPLNA. Bassman, J.H. Black, R.A.; Wang, X.Q. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1989. v. 40 (3). p. 13-15. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

3784

**Effect of copper sulfate and lead acetate on infection of pines with *Buscaphelenchus xylophilus*.**

JONEB. Huber, M.C. Winter, R.E.K.; Bolla, R.I. Raleigh, N.C. : Society of Nematologists. Journal of nematology. Jan 1989. v. 21 (1). p. 1-9. Includes references. (NAL Call No.: DNAL QL391.N4J62).

3785

**Effect of different mycorrhizal fungi on *Pinus radiata* seedling growth.**

Chu-Chou, M. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 208. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

3786

**Effect of ditching, fertilization, and herbicide application on groundwater levels and groundwater quality in a flatwood Spodosol.**

Segal, D.S. Neary, D.G.; Best, G.R.; Michael, J.L. S.I. : The Society. Proceedings - Soil and Crop Science Society of Florida. 1987. v. 46. p. 107-112. Includes references. (NAL Call No.: DNAL 56.9 S032).

3787

**Effect of dosage and ratio of sex pheromone components on behavior of *Chrysoteuchia topiaria* (Zeller) (Lepidoptera: Pyralidae).**

EVETEX. Kamm, J.A. McDonough, L.M.; Rowe, K.E. Lanham, Md. : Entomological Society of America. When the dosage of the primary pheromone component (Z)-11-hexadecenal (Z11-16:A1) of the cranberry girdler, *Chrysoteuchia topiaria* (Zeller), was varied from 0.03 to 10 mg in field tests, maximum catch was obtained at a dosage of less than 1 mg. When (Z)-9-hexadecenal (Z9-16:A1) was present at 0.3, 1, or 3% of Z11-16:A1, trap catch was proportional to the logarithm of the dosage over the same concentration range. The amount of Z9-16:A1 that produced maximum trap catches within calculated confidence limits of each

dosage ranged from 0.2 to 2.1% when the dosages of Z11-16:A1 were 0.3, 1, 3, and 10 mg. Z9-16:A1 at 1% always was included within the confidence limits of these dosages. The two higher dosages captured significantly more males than the two lower dosages, but trap catches were not significantly different between dosages of 0.3-1 and 3-10 mg. The reduced trap catch by Z11-16:A1 alone for dosages above 1 mg was the result of the absence of an important pheromone component. In flight tunnel studies, Z11-16:A1 induced limited plume-oriented flight (19% of tested males) at a dosage of 0.03 mg only, and males did not reach the source. The percentage of males exhibiting upwind flight in the plume increased dramatically when Z9-16:A1 was present. At a dosage of 0.3 mg, upwind flight in the plume was 0% for the single component and 90% for the two components. Maximum upwind flight occurred at dosages from 0.03 to 3 mg and, as occurred in field tests, the Z9-16:A1 at 1% of Z11-16:A1 always was included within the calculated confidence limits for these dosages. The 3-mg dosage of Z11-16:A1 reduced the number of males landing on the septa. Environmental entomology. June 1989. v. 18 (3). p. 368-372. Includes references. (NAL Call No.: DNAL QL461.E532).

3788

**The effect of drought on growth decline of loblolly pine on littleleaf sites.**

PLDIDE. Jacobi, J.C. Tainter, F.H.; Oak, S.W. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 294-297. Includes references. (NAL Call No.: DNAL 1.9 P69P).

3789

**Effect of environment, tree size and presence of wetwood symptoms on injectability of American elm.**

JOARD. Stack, R.W. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Aug 1988. v. 14 (8). p. 195-199. Includes references. (NAL Call No.: DNAL SB436.J6).

3790

**The effect of *Erynia radicans* on food consumption, utilization and fecundity by the spruce budworm, *Choristoneura fumiferana*.**

XGNEA. Mohamed, A.K.A. Lewis, L.; Lewis, D. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 77-81. Includes references. (NAL Call No.: DNAL aSD11.U56).



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3791

**Effect of excess aluminum and manganese on Norway spruce seedlings as related to magnesium nutrition.**

JPNUDS. Hecht-Buchholz, C. Jorns, C.A.; Keil, P. New York, N.Y. : Marcel Dekker. Journal of plant nutrition. Paper presented at the "Tenth International Plant Nutrition Colloquium," August 4-9, 1986, Beltsville, Maryland. 1987. v. 10 (9116). p. 1103-1110. ill. Includes references. (NAL Call No.: DNAL QK867.J67).

3792

**Effect of experience on the responses of the parasitoid *Brachymeria intermedia* (Hymenoptera: Chalcididae) to its host, *Lymantria dispar* (Lepidoptera: Lymantriidae), and to kairomone.** AESAAI. Carde, R.T. Lee, H.P. Lanham, Md. : The Society. Annals of the Entomological Society of America. Sept 1989. v. 82 (5). p. 653-657. ill. Includes references. (NAL Call No.: DNAL 420 EN82).

3793

**Effect of fall sowing and solar heating of soil on two conifer seedling diseases.**

TPLNA. McCain, A.H. Bega, R.V.; Jenkinson, J.L. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1986. v. 37 (4). p. 17-20. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

3794

**Effect of family and nitrogen fertilizer on growth and foliar nutrients of Douglas-fir saplings.**

FOSCA. DeBell, D.S. Silen, R.R.; Radwan, M.A.; Mandel, N.L. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1986. v. 32 (3). p. 643-652. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3795

**Effect of gallberry on early slash and loblolly pine growth.**

SWSPBE. Neary, D.G. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 251-255. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

3796

**Effect of height on responses of redheaded pine sawfly (Hymenoptera: Diprionidae) males to synthetic pheromone and virgin females.**

EVETEX. Wilkinson, R.C. Chappelka, A.H. III; Kraemer, M.E.; Coppel, H.C.; Mastsumura, F. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1152-1156. Includes references. (NAL Call No.: DNAL QL461.E532).

3797

**Effect of juvenile hormone analog, fenoxycarb, on pheromone production by *Ips paraconfusus* (Coleoptera: Scolytidae).**

JCECD. Chen, N.M. Borden, J.H.; Pierce, H.D. Jr. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1988. v. 14 (4). p. 1087-1098. Includes references. (NAL Call No.: DNAL QD415.A1J6).

3798

**Effect of *Lophodermium seditiosum* on growth of pine nursery seedlings in Wisconsin.**

PLDIDE. Ostry, M.E. Nicholls, T.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1989. v. 73 (10). p. 798-800. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

3799

**Effect of mycorrhizal fungi on growth and development of roots in seedlings of *Pinus resinosa*.**

Yang, C.S. Wilcox, H.E. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 348. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

3800

**Effect of *Nosema fumiferanae* (Microsporida) on fecundity, fertility, and progeny performance of *Choristoneura fumiferana* (Lepidoptera: Tortricidae).**

EVETEX. Bauer, L.S. Nordin, G.L. Lanham, Md. : Entomological Society of America. Female eastern spruce budworm, *Choristoneura fumiferana* (Clemens), inoculated sublethally as fourth or fifth instars with *Nosema fumiferanae* (Thomson), exhibited significant reductions in size, fecundity, and total egg complement. Mating success and egg fertility were similar for treated and control insects. The presence of disease improved the positive correlation between fecundity or total egg complement and female pupal weight without significantly

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reducing the slope. Total egg complement was negatively correlated with disease load. A subsample of progeny reared from each fertile mating indicates 100% transovarial transmission efficiency at the spore dosages provided. Diseased progeny experienced twice the larval mortality, and surviving individuals were approximately 25% smaller and took 17% longer to complete development than healthy progeny. Maternal disease load was a significant, positive factor in percentage progeny mortality and male pupal weight. Environmental entomology. Apr 1989. v. 18 (2). p. 261-265. Includes references. (NAL Call No.: DNAL QL461.E532).

3801

**Effect of nursery culture on morphological and physiological development of western hemlock seedlings.**

Arnott, J.T. Dunsworth, B.G.; O'Reilly, C.D. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 38-44. Includes references. (NAL Call No.: DNAL aSD11.A42).

3802

**Effect of nursery treatment on shoot length components of western hemlock seedlings during the first year of field establishment.**

O'Reilly, C. Owens, J.N.; Arnott, J.T.; Dunsworth, B.G. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 188-194. Includes references. (NAL Call No.: DNAL aSD11.A42).

3803

**Effect of operational fertilization on foliar nutrient content and growth of young Douglas-fir and Pacific silver fir.**

XPNWA. Cochran, P.H. Lopushinsky, W.; McColley, P.D. Portland, Or. : The Station. PNW research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. July 1986. (445). 10 p. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

3804

**Effect of paclobutrazol on conifer seedling morphology and field performance.**

Rietveld, W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 19-23. Includes references. (NAL Call No.: DNAL aSD11.A42).

3805

**Effect of pandora moth (Lepidoptera: Saturniidae) defoliation on growth of ponderosa pine in Arizona.**

JEENAI. Miller, K.K. Wagner, M.R. Lanham, Md. Entomological Society of America. Defoliation of ponderosa pine, *Pinus ponderosa* Douglas ex Lawson and Lawson, by the pandora moth, *Coloradia pandora* Blake, results in a significant reduction in basal area growth compared with undefoliated trees. A high proportion (83%) of heavily defoliated trees produced no growth in the year following defoliation. Heavily defoliated trees produced more growth than moderately defoliated trees one year after the last defoliation. Overall, tree growth is not related linearly to defoliation intensity. Journal of economic entomology. Dec 1989. v. 82 (6). p. 1682-1686. Includes references. (NAL Call No.: DNAL 421 J822).

3806

**Effect of paraquat plus prescribed burning on eastern redcedar (*Juniperus virginiana*).**

WETEE9. Engle, D.M. Stritzke, J.F.; Claypool, P.L. Champaign, Ill. : The Society. Weed technology : a journal of the Weed Science Society of America. Apr 1988. v. 2 (2). p. 172-174. Includes references. (NAL Call No.: DNAL SB610.W39).

3807

**Effect of phloem water relations on the growth of *Phytophthora cinnamomi* in *Eucalyptus marginata*.**

PHYTAJ. Tippet, J.T. Crombie, D.S.; Hill, T.C. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Feb 1987. v. 77 (2). p. 246-250. Includes references. (NAL Call No.: DNAL 464.8 P56).



## (FORESTRY RELATED)

3808

**Effect of pine oil on landing and attack by the southern pine beetle (Coleoptera: Scolytidae).**  
JESCEP. O'Donnell, B.P. Payne, T.L.; Walsh, K.D. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Oct 1986. v. 21 (4). p. 319-321. (NAL Call No.: DNAL QL461.G4).

3809

**Effect of pinewood nematode density on tethered flight of *Monochamus carolinensis* (Coleoptera: Cerambycidae).**

EVETEX. Lanham, Md. : Entomological Society of America. *Monochamus carolinensis* (Olivier) beetles infested with the pinewood nematode, *Bursaphelenchus xylophilus*, were tethered and flown upon emergence from host logs. The mean (+/-SD) number of nematodes carried per beetle was, 7,933, (+/-16,997) with a mean flight time of 18.6 (+/-11.4) min. Larger beetles exhibited longer flights and carried more nematodes. The density of nematodes in the beetle had a slight negative influence on flight capability. The sex of the beetle had no effect on flight duration or the number of nematodes carried. Environmental entomology. Aug 1989. v. 18 (4). p. 670-673. Includes references. (NAL Call No.: DNAL QL461.E532).

3810

**Effect of plant resistance, competition, and enemies on a leaf-galling sawfly (Hymenoptera: Tenthredinidae).**

EVETEX. Clancy, K.M. Price, P.W. Lanham, Md. : Entomological Society of America. The relative importance of three sources of larval mortality (host plant resistance, intraspecific competition, and natural enemies) was evaluated for a population of leaf-galling sawflies, *Pontania* sp., near *P. pacifica* Marlatt, on arroyo willow, *Salix lasiolepis* Benth, at a site in Flagstaff, Ariz., from 1981 to 1984. The ratio of the percentage of sawfly larvae killed by natural enemies to the percentage lost to host plant defenses (i.e., abortion, defined as an aborted formation of a gall resulting from death of the egg or small larva) was 1.53:1. Mortality from abortion was divided into a host plant resistance component (constitutive abortion, e.g., a plant resistance factor preventing establishment of the egg or small larva) and an intraspecific competition-mediated component (because abortion increased as within-leaf gall densities rose). Natural enemies caused twice as much mortality as plant resistance and 6.36 times greater mortality than intraspecific competition. These results support the hypothesis that third-trophic-level effects exert a stronger selective pressure on many insect populations than competition for limiting resources. There was evidence that intraspecific competition for limiting food resources occurred for these *Pontania* sp. sawflies; increased within-leaf gall densities had a density-dependent, linear, negative

effect on gall size, and consequently, on larval biomass because sawfly size was positively correlated with gall size. However, only about 3% of the variation in gall size was explained by within-leaf gall density. Thus, gall (and larval) size were only weakly affected by intraspecific competition. Environmental entomology. Apr 1989. v. 18 (2). p. 284-290. Includes references. (NAL Call No.: DNAL QL461.E532).

3811

**Effect of prey density on diurnal activity and ovarian development in *Calosoma calidum* (Coleoptera: Carabidae): implications for biological control of the gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae) in the Midwest.**

GRLEA. Jeffords, M.R. Case L.J. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Summer 1987. v. 20 (2). p. 93-97. Includes references. (NAL Call No.: DNAL QL461.M5).

3812

**Effect of selected chemicals on non-suberized impervious tissue (NIT) formation in Fraser fir.**

GENSAB. Arthur, F.H. Hain, F.P. Tifton, Ga. : The Society. Journal of Entomological Science. July 1985. v. 20 (3). p. 305-311. Includes references. (NAL Call No.: DNAL QL461.G4).

3813

**Effect of short-term storage of triadimefon-treated loblolly pine seed on incidence of fusiform rust.**

SJAFFD. Kelley, W.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1988. v. 12 (1). p. 18-20. Includes references. (NAL Call No.: DNAL SD1.S63).

3814

**Effect of simulated insect damage on growth and survival of northern red oak (*Quercus rubra* L.) seedlings.**

EVETEX. Wright, S.L. Hall, R.W.; Peacock, J.W. Lanham, Md. : Entomological Society of America. Effects of simulated insect damage--artificial defoliation and root damage in combination with two levels of watering--were studied to determine the potential effect on northern red oak seedlings (*Quercus rubra* L.). Treatments and treatment combinations caused significant differences in stem diameter, percentage of stem dieback, and mortality. Defoliation and a regime of decreased watering seemed to have the greatest effect on seedling growth and mortality. Root injury had no consistent direct effect, but interacted significantly with other factors. Insect damage to foliage and roots,

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together with water stress, may be a factor in poor survival of oak seedlings under field conditions. Environmental entomology. Apr 1989. v. 18 (2). p. 235-239. Includes references. (NAL Call No.: DNAL QL461.E532).

3815

**Effect of site preparation and vegetation control on slash pine plantation growth.**  
SWSPBE. Shiver, B.D. Rheney, J.W.; Pienaar, L.V.; Fortson, J.C. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. 1986. (39th). p. 210-216. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

3816

**Effect of slow release fertilizers on formation of mycorrhizae and growth of container grown pine seedlings.**  
Crowley, D.E. Maronek, D.M.; Hendrix, J.W. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1986. v. 4 (3). p. 97-101. Includes 11 references. (NAL Call No.: DNAL SB1.U66).

3817

**Effect of soil compaction and oxygen content on vertical and horizontal root distribution.**  
Gilman, E.F. Leone, I.A.; Flower, F.B. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1987. v. 5 (1). p. 33-36. 111. Includes references. (NAL Call No.: DNAL SB1.U66).

3818

**Effect of stratification, drying, and cold storage on noble fir and Pacific silver fir.**  
JSTED. Hall, O. Olson, E. East Lansing, Mich. : Association of Official Seed Analysts. Journal of seed technology. 1986. v. 10 (1). p. 58-61. Includes 8 references. (NAL Call No.: DNAL SB113.2.U6).

3819

**Effect of sulfometuron methyl on ground water and stream quality in coastal plain forest watersheds.**  
WARBA. Neary, D.G. Michael, J.L. Minneapolis, Minn. : American Water Resources Association. Water resources bulletin. June 1989. b v. 25 (3). p. 617-623. maps. Includes references. (NAL Call No.: DNAL 292.9 AM34).

3820

**Effect of tebuthiuron on soil N mineralization and nitrification.**  
CSOSA2. Goodroad, L.L. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. Apr 1987. v. 18 (4). p. 473-481. Includes references. (NAL Call No.: DNAL S590.C63).

3821

**Effect of temperature on germination of conidia of Gloeosporium aridum.**  
PNDAAZ. Redlin, S.C. Stack, R.W. Grand Forks, N.D. : The Academy. Proceedings of the North Dakota Academy of Science. Apr 1986. v. 40. p. 63. Includes references. (NAL Call No.: DNAL 500 N813).

3822

**Effect of thinning damage on bark beetle susceptibility indicators in loblolly pine.**  
Blanche, C.A. Nebeker, T.E.; Hodges, J.D.; Karr, B.L.; Schmitt, J.J. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 471-479. Includes references. (NAL Call No.: DNAL aSD11.U57).

3823

**Effect of timing of cold storage on cold hardiness and root growth potential of Douglas-fir.**  
Burr, K.E. Tinus, R.W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 133-138. Includes references. (NAL Call No.: DNAL aSD11.A42).

3824

**Effect of triadimefon on development of mycorrhizae from natural inoculum in loblolly pine nursery beds.**  
SJAFD. Kelley, W.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1987. v. 11 (1). p. 49-52. Includes references. (NAL Call No.: DNAL SD1.S63).



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3825

**Effect of trunk injection of flurprimidol and paclobutrazol on sprout growth in silver maple.**  
JOARD. Arron, G.P. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1986. v. 12 (9). p. 233-236. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

3826

**Effect of two insecticides on abundance of insect families associated with Siberian elm windbreaks.**  
JKESA. Frye, R.D. Dix, M.E.; Carey, D.R. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1988. v. 61 (3). p. 278-284. Includes references. (NAL Call No.: DNAL 420 K13).

3827

**Effect of verbenone on response of *Dendroctonus brevicomis* to exo-brevicomin, frontalin, and myrcene.**  
JCECD. Tilden, P.E. Bedard, W.D. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1988. v. 14 (1). p. 113-122. Includes references. (NAL Call No.: DNAL QD415.A1J6).

3828

**Effect of water stress and phenology on glyphosate efficacy in forest trees.**  
SWSPBE. D'Anieri, P. Zedaker, S.M.; Kreh, R.E.; Seiler, J.R. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 208-215. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

3829

**Effective herbicide use in Christmas tree plantations.**  
MUCBA. Lantagne, D. Koelling, M.; Dickman, D. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. Feb 1986. (1930). 12 p. ill. (NAL Call No.: DNAL 275.29 M58B).

3830

**Effective residual life of carbaryl for protecting ponderosa pine from attack by the western pine beetle (Coleoptera: Scolytidae).**  
JEENAI. Haverty, M.I. Shea, P.J.; Hall, R.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1985. v. 78 (1). p. 197-199. Includes references. (NAL Call No.: DNAL 421 J822).

3831

**Effectiveness and vegetation response to triclopyr tree injection on selected plots in eastern New York.**  
PNWSB. Jackson, L.W. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1986. v. 40. p. 236-240. Includes references. (NAL Call No.: DNAL 79.9 N814).

3832

**Effectiveness of carbaryl and acephate in reducing damage by *Petrova metallica* (Busck) (Lepidoptera: Tortricidae) in ponderosa pine windbreaks.**  
XARRA. Dix, M.E. Fort Collins, Colo. : The Station. USDA Forest Service research note RM - United States, Rocky Mountain Forest and Range Experiment Station. Oct 1985. (458). 3 p. Includes references. (NAL Call No.: DNAL A99.9 F7632US).

3833

**Effects of a nuclear polyhedrosis virus isolate from *Malacosoma disstria* on *Lymantria dispar* larval growth pattern.**  
JIVPA. Stairs, G.R. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. Mar 1989. v. 53 (2). p. 247-250. Includes references. (NAL Call No.: DNAL 421 J826).

3834

**Effects of abamectin and milbemycin D on gypsy moth (Lepidoptera: Lymantriidae).**  
JEENAI. Deecher, D.C. Brezner, J.; Tanenbaum, S.W. Lanham, Md. : Entomological Society of America. Effects of abamectin and milbemycin D on gypsy moth, *Lymantria dispar* L., were determined. Fifty percent of third instars exposed for 2 h to 5.2 ppm milbemycin D on artificial diet were flaccid and paralyzed, whereas larvae exposed to 5.0 ppm abamectin were unaffected. When larvae were exposed to abamectin on artificial diet for 24 or 48 h, 50% of third instars died. Larvae exposed for 24 h to milbemycin D were not affected, but at 48 h 165 ppm caused 50% mortality of third instars. When larvae were exposed to milbemycin D residues for 48 h and observed 5 d later, the LC50 was 92 ppm. LC50's (ppm) when larvae were exposed for 72 h to residues on poplar foliage were 4 for abamectin, 1,454 for milbemycin D, and 125 for carbaryl. Five days after exposure to foliage residues, LC50's (ppm) were 1 for abamectin, 244 for milbemycin D and 106 for carbaryl. On both substrates, abamectin was most toxic to third instars. Larvae exposed for 2 h to milbemycin D residues were flaccid and paralyzed but the effect was reversible. Journal of economic entomology. Oct 1989. v. 82 (5). p. 1395-1398. Includes references. (NAL Call No.: DNAL 421 J822).

3835

**The effects of acid deposition on forest ecosystems Minnesota's response : literature review /by Brian D. McCann.**

McCann, Brian D. St. Paul, Mn. (Box 44, St. Paul 55146) : State of Minnesota, Dept. of Natural Resources, Division of Forestry, 1985. "November 1985.". 43, 15 leaves : ill., maps ; 28 cm. Bibliography: p. 42-43. (NAL Call No.: DNAL SB745.M35).

3836

**Effects of aerial detection schedules on the age of southern pine beetle infestations.**

FOSCA. De Steiguer, J.E. Hedden, R.L. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1988. v. 34 (1). p. 229-235. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3837

**Effects of application rate and timing of ethephon treatments on abscission of ponderosa pine dwarf mistletoe.**

Johnson, D.W. Hildebrand, D.M.; Hawksworth, F.G. Denver, Colo. : The Service. Technical report R2 - U.S. Department of Agriculture, Forest Service, Forest Pest Management. Jan 1989. (44). 9 p. ill. Includes references. (NAL Call No.: DNAL ASD11.A422).

3838

**Effects of Arceuthobium americanum on twig growth of Pinus contorta.**

XPNWA. Broshot, N. Larsen, L.; Tinnin, R. Portland, Or. : The Station. PNW-RN research note - U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Nov 1986. (453). 6 p. Includes references. (NAL Call No.: DNAL A99.9 F7625U).

3839

**Effects of atmospheric CO2 enrichment on the growth and mineral nutrition of Quercus alba seedlings in nutrient-poor soil.**

PLPHA. Norby, R.J. O'Neill, E.G.; Luxmoore, R.J. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1986. v. 82 (1). p. 83-89. Includes 30 references. (NAL Call No.: DNAL 450 P692).

3840

**Effects of atmospheric deposition on sulfur and nitrogen content of four urban tree species.**

JOARD. Roberts, B.R. Dochinger, L.S.; Townsend, A.M. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1986. v. 12 (9). p. 209-212. Includes

references. (NAL Call No.: DNAL SB436.J6).

3841

**Effects of Bacillus thuringiensis on parasites of western spruce budworm (Lepidoptera: Tortricidae).**

JEENAI. Niwa, C.G. Stelzer, M.J.; Beckwith, R.C. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1987. v. 80 (4). p. 750-753. Includes references. (NAL Call No.: DNAL 421 J822).

3842

**Effects of Bacillus thuringiensis treatments on the occurrence of nuclear polyhedrosis virus in gypsy moth (Lepidoptera: Lymantriidae) populations.**

JEENAI. Woods, S.A. Elkinton, J.S.; Shapiro, M. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1706-1714. Includes references. (NAL Call No.: DNAL 421 J822).

3843

**Effects of bark fragmentation on plant succession on conifer logs in the Picea-Tsuga forests of Olympic National Park, Washington.**

AMNAA. Harmon, M.E. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1989. v. 121 (1). p. 112-124. Includes references. (NAL Call No.: DNAL 410 M58).

3844

**Effects of birds on spruce budworm populations - a progress report.**

Crawford, H.S. Jennings, D.T. Orono, Me. : The Station. Miscellaneous publication - University of Maine, Agricultural Experiment Station. Paper presented at the "Joint Conference of New England Chapter of the Society of American Foresters, Maine Chapter of the Wildlife Society, Atlantic International Chapter of the American Fisheries Society," March 6-8, 1985, Portland, Maine. Apr 1986. (689). p. 315-321. Includes references. (NAL Call No.: DNAL 100 M28S (2)).

3845

**Effects of chemical weed control and seedling planting depth on survival and growth of aspen.**

TPLNA. Reighard, G.L. Howe, G.; Hanover, J.W. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Winter 1985. v. 36 (1). p. 3-7. Includes 15 references. (NAL Call No.: DNAL 1.962 C5T71).



## (FORESTRY RELATED)

3846

**Effects of chronic doses of ozone on loblolly pine: photosynthetic characteristics in the third growing season.**

FOSCA. Sasek, T.W. Richardson, C.J. Bethesda, Md. : Society of American Foresters. Gas exchange characteristics of loblolly pine seedlings were measured in the third growing season of ozone fumigations to determine the effects of long-term ozone exposure on photosynthetic capacity. Light and CO<sub>2</sub> response curves indicated significant decreases of 21% and 27%, respectively, in light-saturated and CO<sub>2</sub>-saturated photosynthetic capacities at 2 X ambient ozone (92 ppb 12-hr seasonal mean) compared to charcoal-filtered (CF) air, approximately 0.5 X ambient ozone (29 ppb 12-hr seasonal mean). Differences in the response curves suggest changes in light-harvesting and biochemical efficiencies as well as changes in the activity of RuBP Carboxylase and the regeneration rate of RuBP. Chlorophyll and carotenoid conditions per unit leaf area were decreased at the high ozone treatment in older flushes. Stomatal resistance limited photosynthesis by about 29% in both CF and 2 X ambient ozone treated plants, suggesting that chronic ozone exposure did not affect stomatal control in loblolly pine. Forest science. Sept 1989. v. 35 (3). p. 745-755. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3847

**Effects of competing vegetation on loblolly pine plantations.**

LDAGA. Clason, T.R. Baton Rouge, La. : The Station. Louisiana agriculture - Louisiana Agricultural Experiment Station. Fall 1987. v. 31 (1). p. 7-9. ill. (NAL Call No.: DNAL 100 L939).

3848

**Effects of conjugated auxins on in vitro root regeneration and shoot growth in larch bud cultures.**

Keathley, D.E. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 102-106. Includes references. (NAL Call No.: DNAL SD399.5.N6).

3849

**Effects of defoliation by the western false hemlock looper on Douglas-fir tree-ring chronologies.**

TRBUA. Alfaro, R.I. MacDonald, R.N. Tucson, Ariz. : Tree-Ring Society. Tree-ring bulletin. 1988. v. 48. p. 3-11. Includes references. (NAL Call No.: DNAL 99.8 T713).

3850

**Effects of defoliation in the developing leaf zone on young Populus X euramericana plants. II. Distribution of 14C-photosynthate after defoliation.**

FOSCA. Bassman, J.H. Dickmann, D.I. Washington : Society of American Foresters. Forest science. June 1985. v. 31 (2). p. 358-366. ill. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3851

**Effects of different urea fertilizers on soil and trees in a young thinned stand of western hemlock.**

SSSJD4. Radwan, M.A. DeBell, D.S. Madison, Wis. : The Society. Effects of three different urea fertilizers on selected chemical characteristics of soils and foliage, and on growth per tree of a 24-yr-old thinned stand of western hemlock Tsuga heterophylla (Raf.) Sarg. were compared at a site in coastal Oregon. Treatments were the following: untreated control (C), urea (U), urea treated with N-Serve nitrapyrin, 2-chloro-6-(trichloromethyl) pyridine (U + NS), and sulfur-coated urea (SCU). Fertilizers were uniformly applied by hand to 0.03-ha plots in March at 224 kg N ha<sup>-1</sup>. Soil, to a depth of 20 cm, and current-year foliage were sampled periodically for 2 yr. Height and diameter of 10 dominant or codominant trees per plot were measured annually for 6 yr. Treatment effects on soil pH varied by fertilizer and sampling date; throughout, pH was lower with U + NS than with U, and the smallest change in pH was associated with SCU. Effects of fertilizer on inorganic N in the soil and on foliar nutrients varied by fertilizer and sampling date. Initially, N-Serve inhibited nitrification and produced the highest NH<sub>4</sub>-N concentrations. In general, all fertilizers increased inorganic N in the soil and total N in the foliage. Fertilizers significantly reduced foliar concentrations of some other macronutrients, especially in the first year after fertilization; some depressions were significantly less with SCU than with the other two fertilizers. Height growth per tree was not significantly affected by any of the fertilizers. Basal-area and volume growth per tree were significantly greater with the SCU treatment than with the control, U, or U + NS, treatments. Beneficial effects of SCU seemed to be mostly due to the slow release of N from the fertilizer, although some positive effect of S cannot be ruled out. Soil Science Society of America journal. May/June 1989. v. 53 (3). p. 941-946. Includes references. (NAL Call No.: DNAL 56.9 S03).

(FORESTRY RELATED)

3852

**Effects of Dimilin on diversity and abundance of forest birds.**

Stribling, H.L. Smith, H.R. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Mar 1987. v. 4 (1). p. 37-38. Includes references. (NAL Call No.: DNAL SD143.N6).

3853

**Effects of drainage and severe defoliation on the rawfiber content of balsam fir needles and growth of the spruce budworm (Lepidoptera: Tortricidae).**

EVETEX. Baucé, E. Hardy, Y. College Park, Md. : Entomological Society of America. Analysis of rawfiber content of balsam fir, *Abies balsamea* (L.) Miller, needles in conjunction with laboratory-reared larvae of spruce budworm, *Choristoneura fumiferana* (Clemens), during the 1985 growing season indicated significant variations in the quality of food available for consumption by the insect. Two consecutive years of defoliation as well as poor drainage were directly related to higher rawfiber content of the current year's foliage which, in turn, caused a decrease in pupal weight, larval development rate, and survival. Environmental entomology. Aug 1988. v. 17 (4). p. 671-674. Includes references. (NAL Call No.: DNAL QL461.E532).

3854

**Effects of dwarf mistletoe on spruce in the White Mountains, Arizona.**

GRBNA. Mathiasen, R.L. Hawksworth, F.G.; Edminster, C.B. Provo : Brigham Young University. The Great Basin naturalist. Oct 31, 1986. v. 46 (4). p. 685-689. Includes references. (NAL Call No.: DNAL 410 G79).

3855

**Effects of ectomycorrhiza on host growth and carbon balance in a semi-hydroponic cultivation system.**

NEPHA. Nylund, J.E. Wallander, H. New York, N.Y. : Cambridge University Press. The New phytologist. July 1989. v. 112 (3). p. 389-398. Includes references. (NAL Call No.: DNAL 450 N42).

3856

**The effects of elevated post-storage temperatures on the physiology and survival of white spruce seedlings.**

Binder, W.D. Fielder, P. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11,

1988, Vernon, British Columbia. Dec 1988. (167). p. 122-126. ill. Includes references. (NAL Call No.: DNAL aSD11.A42).

3857

**Effects of ethylene on development and field performance of loblolly pine seedlings.**

Barnett, J.P. Johnson, J.D.; Stumpff, N.J. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 48-53. Includes references. (NAL Call No.: DNAL aSD11.A42).

3858

**Effects of extended prechilling on laboratory germination and fungal infection in seeds of white spruce and eastern white pine.**

TPLNA. Mittal, R.K. Wang, B.S.P.; Harmsworth, D. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Fall 1987. v. 38 (4). p. 6-9. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

3859

**Effects of fertilization on growth and foliar nutrients of red alder seedlings.**

XFPNA. Radwan, M.A. Portland, Or. : The Station. USDA Forest Service research paper PNW-RP - United States, Pacific Northwest Research Station. July 1987. (375). 14 p. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

3860

**Effects of fire on invasion and community structure of a southern Indiana cedar barrens.**

PIACA. Wade, K.A. Menges, E.S. Indianapolis, Ind. : The Academy. Proceedings of the Indiana Academy of Science. Meeting held November 13-15, 1986, University of Indianapolis, Indianapolis, Indiana. 1987. v. 96. p. 273-286. maps. Includes references. (NAL Call No.: DNAL 500 IN2).

3861

**Effects of flooding and nutrient enrichment on biomass allocation in *Acer rubrum* seedlings.**

AJBOA. Day, F.P. Jr. Baltimore, Md. : Botanical Society of America. American journal of botany. Oct 1987. v. 74 (10). p. 1541-1554. Includes references. (NAL Call No.: DNAL 450 AM36).



## (FORESTRY RELATED)

3862

**Effects of flooding and root competition on growth of shaded bottomland hardwood seedlings.**  
AMNAA. Jones, R.H. Sharitz, R.R.; McLeod, K.W. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1989. v. 121 (1). p. 165-175. Includes references. (NAL Call No.: DNAL 410 M58).

3863

**Effects of food, temperature, and breeding conditions on the life span of adults of three cohabitating bark beetle (Scolytidae) parasitoids (Hymenoptera).**  
EVETEX. Mendel, Z. College Park, Md. : Entomological Society of America. The study deals with the adult life span of three hymenopterous parasitoids of bark beetles (Scolytidae)--*Dendrosoter caenopachoides* Ruschka, *D. protuberans* Nees (Braconidae), and *Metacolus unifasciatus* Foerster (Pteromalidae)--investigated under three temperature and two nutrition treatments. Longevity decreased significantly with increasing temperature and absence of carbohydrate in the diet. Regardless of species, life span was about 2 mo with honey plus water at 18 degrees C compared with 20-30 d at 30 degrees C; with water only, the life span was 15-30 d at 18 degrees C and dropped to about 4-8 d at 30 degrees C. Longevity was significantly related to body length of males and females of all tested species when kept on water, but usually not when honey was available. Marked differences between longevities in the same species were attributed to breeding conditions (i.e., differences in host size of parasitoids reared from scolytids of different size). Ecological and silvicultural implications of the findings are discussed. It is suggested that an increase in tree species diversity in the stands might have diversified and increased food sources for adult parasitoids. Environmental entomology. Apr 1988. v. 17 (2). p. 293-298. Includes references. (NAL Call No.: DNAL QL461.E532).

3864

**Effects of forest fragmentation on depredation of artificial nests.**  
JWMAA9. Yahner, R.H. Scott, D.P. Bethesda, Md. : Wildlife Society. Journal of wildlife management. Jan 1988. v. 52 (1). p. 158-161. Includes references. (NAL Call No.: DNAL 410 J827).

3865

**Effects of forest fuel smoke on dwarf mistletoe seed germination.**  
GRBNA. Zimmerman, G.T. Laven, R.D. Provo, Utah : Brigham Young University. The Great Basin naturalist. Oct 31, 1987. v. 47 (4). p. 652-659. Includes references. (NAL Call No.: DNAL 410 G79).

3866

**Effects of forest soil acidification on ectomycorrhizal and vesicular-arbuscular mycorrhizal development.**  
NEPHA. Danielson, R.M. Visser, S. New York, N.Y. : Cambridge University Press. The New phytologist. May 1989. v. 112 (1). p. 41-47. Includes references. (NAL Call No.: DNAL 450 N42).

3867

**Effects of frontalure in suppressing southern pine beetle spot growth under endemic and epidemic population levels.**  
Payne, T.L. Kudon, L.H.; Berisford, C.W.; O'Donnell, B.P.; Walsh, D.K. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 281-285. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

3868

**Effects of fusiform rust on growth of planted slash pines.**  
Burns, P.Y. Hu, S.C. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 231-234. Includes references. (NAL Call No.: DNAL aSD11.U57).

3869

**Effects of fusiform rust on survival and structure of Mississippi and Louisiana loblolly pine plantations.**  
Shoulders, E. Nance, W.L. New Orleans, La. : The Station. USDA Forest Service research paper SO - Southern Forest Experiment Station. 1987. (232). 11 p. Includes references. (NAL Call No.: DNAL A99.9 F7628US).

3870

**Effects of grand fir monoterpenes on the fir engraver, *Scolytus ventralis* (Coleoptera: Scolytidae), and its symbiotic fungus.**  
EVETEX. Raffa, K.F. Berryman, A.A.; Simasko, J.; Teal, W.; Wong, B.L. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1985. v. 14 (5). p. 552-556. Includes references. (NAL Call No.: DNAL QL461.E532).

3871

**Effects of herbaceous weed control using herbicides on a young loblolly pine plantation.** FOSCA. Zutter, B.R. Glover, G.R.; Gjerstad, D.H. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 882-899. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3872

**Effects of implementing EPA's endangered species protection program on national forest systems lands.** PVPCB. Witt, S. Contreras, G.; Ollieu, M.M. Davis, Calif. : University of California. Proceedings ... Vertebrate Pest Conference. 1988. (13th). p. 160-162. Includes references. (NAL Call No.: DNAL SB950.A1V4).

3873

**Effects of increasing carbon dioxide concentration on the physiology and growth of forest trees.** Kramer, P.J. Sionit, N. Washington, D.C. : Conservation Foundation, c1987. The Greenhouse effect, climate change, and U.S. forests / edited by William E. Shands and John S. Hoffman. p. 219-246. Includes references. (NAL Call No.: DNAL SD390.7.G73G74).

3874

**Effects of insecticides on forest structure.** Trial, H. Jr. Orono, Me. : The Station. Miscellaneous publication - University of Maine, Agricultural Experiment Station. Paper presented at the "Joint Conference of New England Chapter of the Society of American Foresters, Maine Chapter of the Wildlife Society, Atlantic International Chapter of the American Fisheries Society," March 6-8, 1985, Portland, Maine. Apr 1986. (689). p. 309-314. Includes references. (NAL Call No.: DNAL 100 M28S (2)).

3875

**Effects of interfering vegetation on biomass, fascicle morphology and leaf area of loblolly pine seedlings.** FOSCA. Zutter, B.R. Gjerstad, D.H.; Glover, G.R. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 1016-1031. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3876

**Effects of intertrap distance and wind direction on the interaction of gypsy moth (Lepidoptera: Lymantriidae) pheromone-baited traps.** EVETEX. Elkinton, J.S. Carde, R.T. Lanham, Md. : Entomological Society of America. More male gypsy moths, *Lymantria dispar* L., were captured in traps at the perimeter compared with traps at the center of a 6- X -6 grid of pheromone traps spaced every 80 m. Additional tests demonstrated suppression of catch at the center of hexagonal arrays of traps with intertrap distances ranging from 2.5 to 40 m. In a hexagonal array of traps spaced every 20 m and monitored every 1-3 h, more males were captured in upwind and downwind traps than in crosswind or central traps. Environmental entomology. Oct 1988. v. 17 (5). p. 764-769. Includes references. (NAL Call No.: DNAL QL461.E532).

3877

**Effects of laminated root rot on relationships between stem growth and root-system size, morphology, and spatial distribution in Douglas-fir.** FOSCA. Bloomberg, W.J. Hall, A.A. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1986. v. 32 (1). p. 202-219. ill. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3878

**Effects of light on location of host egg masses by *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae), an egg parasite of gypsy moth (Lepidoptera: Lymantriidae).** EVETEX. Odell, T.M. Chang, P.Y.; Walton, G.S. Lanham, Md. : Entomological Society of America. The effect of light on host finding and parasitism by *Ooencyrtus kuvanae* (Howard), an egg parasitoid of gypsy moth, *Lymantria dispar* L., was studied in the laboratory. Parasitism by *O. kuvanae* females confined in light or dark cylinders was not significantly different. When parasites were given a choice between light or dark chambers, significantly more chose the light chamber regardless of the presence or absence of an egg mass. However, chambers were significantly more attractive when they contained an egg mass, indicating that an egg mass contributes to host location over short distances. Parasitism of egg masses in dark chambers in which no *O. kuvanae* were found demonstrates that the parasite may leave these sites after oviposition. Implications for success of *O. kuvanae* in low-density gypsy moth populations are discussed. Environmental entomology. Dec 1989. v. 18 (6). p. 1101-1104. Includes references. (NAL Call No.: DNAL QL461.E532).



(FORESTRY RELATED)

3879

**Effects of loblolly pine plantations on songbird dynamics in the Virginia Piedmont.**  
JWMAA9. Childers, E.L. Sharik, T.L.; Adkisson, C.S. Bethesda, Md. : Wildlife Society. Journal of wildlife management. July 1986. v. 50 (3). p. 406-413. Includes references. (NAL Call No.: DNAL 410 J827).

3880

**Effects of microwave treatment of live oak acorns on germination and on Curculio sp. (Coleoptera: Curculionidae) larvae.**  
JEENAI. Crocker, R.L. Morgan, D.L.; Longnecker, M.T. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1987. v. 80 (4). p. 916-920. Includes references. (NAL Call No.: DNAL 421 J822).

3881

**Effects of moisture before and after laboratory spray application of insecticides to western spruce budworm (Lepidoptera: Tortricidae).**  
JEENAI. Robertson, J.L. Preisler, H.K. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1678-1680. Includes references. (NAL Call No.: DNAL 421 J822).

3882

**Effects of mycangial fungi on gallery construction and distribution of bluestain in southern pine beetle-infested pine bolts.**  
GENSAB. Bridges, J.R. Perry, T.J. Tifton, Ga. : The Society. Journal of Entomological Science. Apr 1985. v. 20 (2). p. 271-275. ill. Includes references. (NAL Call No.: DNAL QL461.G4).

3883

**Effects of outbreaks and management responses on big game and other wildlife.**  
XGTIA. Light, J.T. Burbridge, W.B. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Apr 1985. (174). p. 37-43. ill. (NAL Call No.: DNAL aSD11.A48).

3884

**Effects of persistent volcanic ash on Douglas-fir in Northern Idaho.**  
XFIPA. Bilderback, D.E. Carlson, C.E. Ogden, Utah : The Station. USDA Forest Service research paper INT - Intermountain Research Station. Aug 1987. (380). 3 p. Includes references. (NAL Call No.: DNAL A99.9 F764U).

3885

**Effects of pesticide applications on forested watersheds.**  
Neary, D.G. New York, N.Y. : Springer-Verlag. Ecological studies : analysis and synthesis. In the series analytic: Forest hydrology and ecology at Coweeta / edited by W.T. Swank and D.A. Crossley, Jr. Proceedings of a symposium held in October 1984, Athens, Georgia. 1988. v. 66. p. 325-337. (NAL Call No.: DNAL QH540.E288).

3886

**Effects of post-emergent herbicides on survival and growth of planted hardwoods after clearcutting.**  
PNWSB. Shipman, R.D. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held on January 4-6, 1989, Baltimore, Maryland. 1989. v. 43. p. 66-67. (NAL Call No.: DNAL 79.9 N814).

3887

**Effects of prescribed burning on herbaceous vegetation and pocket gophers (Geomys pinetis) in a sandhill community.**  
FLSCA. Gates, C.A. Tanner, G.W. Orlando, Fla. : Florida Academy of Sciences. Florida scientist. Summer/Autumn 1988. v. 51 (3). p. 129-139. Includes references. (NAL Call No.: DNAL 500 F66).

3888

**Effects of prescribed fire on deer forage and nutrients.**  
WLSBA. Wood, G.W. Bethesda, Md. : The Society. Wildlife Society bulletin. Summer 1988. v. 16 (2). p. 180-186. Includes references. (NAL Call No.: DNAL SK357.A1W5).

3889

**Effects of previous stand management of mortality following gypsy moth defoliation.**  
XFGTA. Gottschalk, K.W. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 296. (NAL Call No.: DNAL aSD11.A352).

3890

**Effects of previous stand management on mortality following gypsy moth defoliation: preliminary results.**

Gottschalk, K.W. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 573-578. Includes references. (NAL Call No.: DNAL aSD11.U57).

3891

**Effects of root diseases on the health of western forests.**

Reaves, J.L. Palmer, M.A.; Nelson, E.E. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. Meeting held Oct 16-19, 1988, Rochester, New York. 1989. p. 97-101. Includes references. (NAL Call No.: DNAL SD143.S64).

3892

**Effects of seed handling, pre-germination and planting positions on tree seedling root and stem development.**

Appleton, B.L. Whitcomb, C.E.; Akers, S.W. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Sept 1986. v. 4 (3). p. 69-72. ill. Includes 4 references. (NAL Call No.: DNAL SB1.U66).

3893

**The effects of seed origin on drought resistance of lodgepole pine (*Pinus contorta* Dougl.) seedlings.**

Murdiyarso, D. Roberts, J.M.; Milford, J.R. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 154-156. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

3894

**Effects of short-term phenological changes in leaf suitability on the survivorship, growth, and development of gypsy moth (*Lepidoptera: Lymantriidae*) larvae.**

EVETEX. Raupp, M.J. Werren, J.H.; Sadof, C.S. College Park, Md. : Entomological Society of America. In this report we examine the effects of short-term phenological changes in host suitability on the performance of gypsy moth, *Lymantria dispar* (L.), larvae. The time frame examined was a 2-wk period during which most

gypsy moth larvae hatch and feed in central Maryland. Oak supported high levels of survivorship for almost 2 wk, and beech remained suitable for young larvae for less than 1 wk; hickory and maple were intermediate. Larvae did not respond uniformly to chronological changes in foliage when fed leaves from different tree species. When fed oak, larvae tended to develop more slowly as the season progressed. This trend was less important for hickory. Also, differences in pupal weight were observed for female larvae fed different hosts--oak produced pupae of greater weight; this trend was less pronounced for male larvae. Phenological differences in host suitability may help explain associations of gypsy moth with particular tree species that are commonly observed in the field. Environmental entomology. Apr 1988. v. 17 (2). p. 316-319. Includes references. (NAL Call No.: DNAL QL461.E532).

3895

**Effects of silvicultural practice on bird predation.**

XGNEA. Crawford, H.S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 173-175. Includes references. (NAL Call No.: DNAL aSD11.U56).

3896

**Effects of simulated acid rain, ozone and sulfur dioxide on suitability of elms for elm leaf beetle.**

JOARD. Hall, R.W. Barger, J.H.; Townsend, A.M. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Mar 1988. v. 14 (3). p. 61-66. ill. Includes references. (NAL Call No.: DNAL SB436.U6).

3897

**Effects of site stress on water relations and leaf morphology of two hybrid poplar clones in Northern Michigan.**

O'Connor, J.M. Dickmann, D.I. Ann Arbor, Mich. : The Michigan Academy of Science, Arts, and Letters. Michigan academician. Winter 1985. v. 17 (2). p. 137-147. Includes references. (NAL Call No.: DNAL Q1.A3M5).

3898

**Effects of slash pine phloem nutrition on the reproductive performance of *Ips calligraphus* (Coleoptera: Scolytidae).**

EVETEX. Popp, M.P. Wilkinson, R.C.; Jokela, E.J.; Harding, R.B.; Phillips, T.W. Lanham, Md. : Entomological Society of America. The density of eggs laid per centimeter of gallery by



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laboratory-reared *Ips calligraphus* (German) females was determined following introduction into thin phloem bolts cut from 25-yr-old slash pine, *Pinus elliotii* Engelm. var. *elliottii*, that had been fertilized at the time of planting with a combination of nitrogen, phosphorus, and potassium, or phosphorus alone. Egg density was negatively correlated with female pronotal width (size) and positively correlated with the phloem phosphorus concentration. These two variables explained 64% of the variation in egg density. It is hypothesized that altering egg density in response to varying phloem nutrition represents a resource partitioning mechanism that reduces larval competition. These results also suggest that excessive phosphorus fertilization of slash pine on the Coastal Plain soils could contribute to a build-up in the beetle population without the added benefits of stand growth. *Environmental entomology*. Oct 1989. v. 18 (5). p. 795-799. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Effects of soil compaction on height growth of a California ponderosa pine plantation.**  
Helms, J.A. Alexander, E.B. Bethesda, Md. : Society of American Foresters. *Western journal of applied forestry*. Oct 1986. v. 1 (4). p. 104-108. Includes references. (NAL Call No.: DNAL SD388.W6).

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**Effects of soil compaction on root growth characteristics of yellow-poplar and sweetgum seedlings.**  
Simmons, G.L. Pope, P.E. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 264-268. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

3901

**Effects of soil solar heating on thermotolerant microorganisms antagonistic to pathogenic *Fusarium* spp. at Bessey Nursery, Halsey, Nebraska.**  
Hildebrand, D.M. Denver : The Service. Technical report R2 - United States Forest Service, Forest Pest Management. Dec 1986. (37). 10 p. ill. Includes references. (NAL Call No.: DNAL aSD11.A422).

3902

**Effects of soil type and compaction on the growth of *Ailanthus altissima* seedlings.**  
Pan, E. Bassuk, N. Washington, D.C. : Horticultural Research Institute. *Journal of environmental horticulture*. Dec 1985. v. 3 (4). p. 158-162. Includes 13 references. (NAL Call No.: DNAL SB1.U66).

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**Effects of stand conditions on parasitoid dynamics.**  
XGNEA. Hanson, P.M. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 177-183. Includes references. (NAL Call No.: DNAL aSD11.U56).

3904

**Effects of tebuthiuron site preparation on white-tailed deer habitat.**  
WLSBA. DeFazio, J.T. Jr. Stone, A.E.; Warren, R.J. Bethesda, Md. : The Society. *Wildlife Society bulletin*. Spring 1988. v. 16 (1). p. 12-18. (NAL Call No.: DNAL SK357.A1W5).

3905

**Effects of temperature and slash pine phloem thickness on *Ips calligraphus* life processes.**  
Haack, R.A. Foltz, J.L.; Wilkinson, R.C. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 102-113. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

3906

**Effects of terpenoid compounds on growth of symbiotic fungi associated with the southern pine beetle.**  
PHYTAJ. Bridges, J.R. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Jan 1987. v. 77 (1). p. 83-85. Includes references. (NAL Call No.: DNAL 464.8 P56).

3907

Effects of thiabendazole-DMSO treatment of longleaf pine seed contaminated with *Fusarium subglutinans* on germination and seedling survival.

PLDIDE. Runion, G.B. Bruck, R.I. St. Paul, Minn. : American Phytopathological Society. Plant disease. Oct 1988. v. 72 (10). p. 872-874. Includes references. (NAL Call No.: DNAL 1.9 P69P).

3908

The effects of thiabendazole on *Fusarium subglutinans*, the causal agent of pitch canker of loblolly pine.

PLDIDE. Runion, G.B. Bruck, R.I. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 297-300. Includes references. (NAL Call No.: DNAL 1.9 P69P).

3909

Effects of thinning in reducing stand risk to southern pine beetle in the Georgia Piedmont.

XFGSA. Price, T.S. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 12-15. maps. Includes references. (NAL Call No.: DNAL aSD433.A53).

3910

Effects of three insect growth regulators, feeding substrates, and colony origin on survival and presoldier production of the formosan subterranean termite (Isoptera: Rhinotermitidae).

JEENAI. Su, N.Y. Tamashiro, M.; Haverty, M.I. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1985. v. 78 (6). p. 1259-1263. Includes references. (NAL Call No.: DNAL 421 J822).

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Effects of treatment and seed source on germination of eastern redcedar seed.

XFRMA. Van Haverbeke, D.F. Comer, C.W. Fort Collins, Colo. : The Station. USDA Forest Service research paper RM - United States, Rocky Mountain Forest and Range Experiment Station. Nov 1985. (263). 7 p. maps. Includes references. (NAL Call No.: DNAL A99.9 F7632U).

3912

Effects of triadimefon and triadimenol as seed dressings on incidence of fusiform rust on loblolly pine seedlings.

PLDRA. Kelley, W.D. Williams, J.C. St. Paul, Minn. : American Phytopathological Society. Plant disease. Feb 1985. v. 69 (2). p. 147-148. ill. Includes 6 references. (NAL Call No.: DNAL 1.9 P69P).

3913

Effects of triadimefon on growth and ectomycorrhizal development of loblolly and slash pines in nurseries.

PHYTAU. Marx, D.H. Cordell, C.E.; France, R.C. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Aug 1986. v. 76 (8). p. 824-831. Includes references. (NAL Call No.: DNAL 464.8 P56).

3914

Effects of ultraviolet-B irradiation on seedling growth in the Pinaceae.

AUBOAA. Sullivan, J.H. Teramura, A.H. Columbus, Ohio : Botanical Society of America. American journal of botany. Feb 1988. v. 75 (2). p. 225-230. Includes references. (NAL Call No.: DNAL 450 AM36).

3915

Effects of understory removal in hardwood stands.

Kelty, M.J. Gould, E.M. Jr.; Twery, M.J. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Sept. 1987. v. 4 (3). p. 162-164. Includes references. (NAL Call No.: DNAL SD143.N6).

3916

The effects of using pollen contaminated with conidia of *Fusarium moniliforme* var. *subglutinans* on control-pollinated strobili of slash pine.

Miller, T. Blakeslee, G.M.; Bramlett, D.L.; Matthews, F.R. s.l. : Southern Forest Tree Improvement Committee. Proceedings of the ... Southern Forest Tree Improvement Conference. 1987. (41). p. 232-239. Includes references. (NAL Call No.: DNAL A99.9 F769).

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Effects of water and temperature.

Jones, J.R. Kaufmann, M.R.; Richardson, E.A. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. 1985. (119). p. 71-76. ill. (NAL Call No.: DNAL aSD11.A42).



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**Effects of water rinse treatments on occurrence of fungi on spruce seed from the Towner Nursery, North Dakota.**

James, R.L. Missoula, Mont. : The Region. Report - USDA Forest Service, Forest Pest Management, Northern Region. Mar 1987. (87-5). 4 p. Includes references. (NAL Call No.: DNAL aSD11.U585).

3919

**Effects of wet-season management burns on chaparral vegetation: implications for rare species.**

Parker, V.T. Sacramento, Calif. : California Native Plant Society, c1987. Conservation and management of rare and endangered plants : proceedings of a California Conference on the Conservation and Management of Rare and Endangered Plants / edited by Thomas S. Elias ; foreword by Jim Nelson. Paper presented at a Conference on the "Conservation and Management of Rare and Endangered Plants," November 5-8, 1986, Sacramento, California. p. 233-237. Includes references. (NAL Call No.: DNAL QK86.U6C65 1986).

3920

**The effects of white spruce stunting on seedling growth.**

TPLNA. Croghan C.F. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Spring 1985. v. 36 (2). p. 10-21. Includes 2 references. (NAL Call No.: DNAL 1.962 C5T71).

3921

**Effects of xylem-colonizing *Bacillus* spp. on verticillium wilt in maples.**

PLDRA. Hall, T.J. Schreiber, L.R.; Leben, C. St. Paul, Minn. : American Phytopathological Society. Plant disease. June 1986. v. 70 (6). p. 521-524. Includes 33 references. (NAL Call No.: DNAL 1.9 P69P).

3922

**Efficacy and economics of selected systemic insecticides for control of *Phoracantha semipunctata* (Coleoptera: Cerambycidae), a new pest in North America.**

JEENAI. Ali, A.D. Garcia, J.M. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1124-1127. Includes references. (NAL Call No.: DNAL 421 J822).

3923

**Efficacy and timing of metsulfuron methyl in forestry in Maine.**

PNWSB. Maass, D. Prouty, R. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1986. v. 40. p. 230-232. (NAL Call No.: DNAL 79.9 N814).

3924

**Efficient monitoring for an urban IPM program.**

JOARD. Ball, J. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. July 1987. v. 13 (7). p. 174-177. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Efforts to combat pesticide legislation for arborists.**

JOARD. Alampi, P. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Dec 1986. v. 12 (12). p. 309-311. (NAL Call No.: DNAL SB436.J6).

3926

**Egg contamination as a method for the inoculative release of exotic microsporidia of the gypsy moth.**

JIVPA. Jeffords, M.R. Maddox, J.V.; McManus, M.L.; Webb, R.E.; Wieber, A. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. May 1988. v. 51 (3). p. 190-196. Includes references. (NAL Call No.: DNAL 421 J826).

3927

**Eight years of juniper control by burning.**

Hyatt, S.W. Denver, Colo. : Society for Range Management. Rangelands. Feb 1987. v. 9 (1). p. 12-13. ill. Includes references. (NAL Call No.: DNAL SF85.A1R32).

3928

**Electrical methods for evaluating growth and decay potentials of fir/spruce sites.**

XGNEA. Shortle, W.C. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 99-103. Includes references. (NAL Call No.: DNAL aSD11.U56).

3929

**Electroantennogram responses by mountain pine beetles, *Dendroctonus ponderosae* Hopkins, exposed to selected semiochemicals.**

JCECD. Whitehead, A.T. New York, N.Y. : Plenum Press. Journal of chemical ecology. July 1986. v. 12 (7). p. 1603-1621. Includes references. (NAL Call No.: DNAL QD415.A1U6).

3930

**Electromagnetic treatment of loblolly pine seeds.**

XFNSA. Barnett, J.P. Krugman, S.L. New Orleans, La. : The Station. Research note SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Nov 1989. (356). p. 1-7. Includes references. (NAL Call No.: DNAL A99.9 F7628U).

3931

**Elevated parasitism in artificially augmented populations of *Lymantria dispar* (Lepidoptera: Lymantriidae).**

EVETEX. Liebhold, A.M. Elkinton, J.S. Lanham, Md. : Entomological Society of America. Within 1-ha plots, gypsy moth, *Lymantria dispar* L., densities were artificially elevated from low densities (about 20 egg masses/ha) to high densities (8,000 egg masses/ha) using field-collected eggs and F1 sterile laboratory-reared eggs. At all sites, including the feral and sterile release areas, densities decreased to undetectable levels (less than 10 egg masses/ha). In the sterile and feral release areas, parasitism by *Cotesia melanoscela* (Ratzeburg) was the largest source of identified mortality and was significantly greater than in the surrounding area or in untreated plots. Within the feral release area, parasitism by *Compsilura concinnata* (Meigen) and *Parasetigena silvestris* (Robineau-Desvoidy) was substantial and was greater than in the surrounding area. This pattern was not observed in the sterile release area. This difference may have been caused by differences in gypsy moth phenologies between the two populations. Spatially density-dependent mortality caused by parasitoids is hypothesized to be important in the regulation of low-density populations. Furthermore, this mortality may have profound effects on attempts to suppress populations using releases of induced-inherited sterile insects. Environmental entomology. Dec 1989. v. 18 (6). p. 986-995. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

3932

**Elicitation of defensive reactions in conifers.**

Lieutier, F. Berryman, A.A. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 313-319. ill. Includes references. (NAL Call No.: DNAL

SB761.M46)

3933

**Endemic and epidemic populations of southern pine beetle: implications of the two-phase model for forest managers.**

FOSCA. Mawby, W.D. Hain, F.P.; Doggett, C.A. Bethesda, Md. : Society of American Foresters. Typical of many *Dendroctonus* species, the southern pine beetle (*D. frontalis* Zimmerman) exhibits dramatic fluctuations in population levels. Using field observations of beetle damage, this study empirically demonstrates that a two-phase model described for mountain pine beetle (*D. ponderosae* Hopkins) is appropriate for southern pine beetle at each of five hierarchical levels: the tree, the local infestation, the county, the state, and the region. The model has three points that represent a stable low-level (endemic) phase maintained by host-tree-defensive capabilities, a transient high-level (epidemic) phase determined by the availability of host material, and a threshold between the two phases. The threshold depends on local environmental and biotic factors and is a rarely observed phenomenon. Implications of these results for southern pine beetle management and control are discussed. The necessity for establishing and maintaining control programs during the endemic phase is stressed. Forest science. Dec 1989. v. 35 (4). p. 1075-1087. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3934

**Energetics of pine defense systems to bark beetle attack.**

Sharpe, P.J.H. Wu, H.I.; Cates, R.G.; Coeschl, J.D. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 206-223. ill. Includes references. (NAL Call No.: DNAL aSD11.U57).

3935

**Enhanced ethylene emissions from red and Norway spruce exposed to acidic mists.**

PLPHA. Chen, Y.M. Wellburn, A.R. Rockville, Md. : American Society of Plant Physiologists. Acidic cloudwater is believed to cause needle injury and to decrease winter hardiness in conifers. During simulations of these adverse conditions, rates of ethylene emissions from and levels of 1-aminocyclopropane-1-carboxylic acid (ACC) in both red and Norway spruce needles increased as a result of treatment with acidic mists but amounts of 1-malonyl(amino)cyclopropane-1-carboxylic acid remained unchanged. However, release of significant quantities of ethylene by another mechanism independent of ACC was also detected



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from brown needles. Application of exogenous plant growth regulators such as auxin, kinetin, abscisic acid and gibberellic acid (each 0.1 millimolar) had no obvious effects on the rates of basal or stress ethylene production from Norway spruce needles. The kinetics of ethylene formation by acidic mist-stressed needles suggest that there is no active inhibitive mechanism in spruce to prevent stress ethylene being released once ACC has been formed. Plant physiology. Sept 1989. v. 91 (1). p. 357-361. Includes references. (NAL Call No.: DNAL 450 P692).

3936

### **Enhanced herbaceous weed control in conifers with combinations of nitrogen fertilizer formulations and hexazinone.**

WSWPA. White, D.E. Newton, M.; Cole, E.C. Reno : The Society. Proceedings - Western Society of Weed Science. Paper presented at the annual meeting of the Western Society of Weed Science, March 18-20, 1986, San Diego, California. 1986. v. 39. p. 102-106. (NAL Call No.: DNAL 79.9 W52).

3937

### **Enhancement of baculovirus activity on gypsy moth (Lepidoptera: Lymantriidae) by chitinase.**

JEENAI. Shapiro, M. Preisler, H.K.; Robertson, J.L. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1113-1116. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Enhancement of baculovirus activity on gypsy moth (Lepidoptera: Lymantriidae) by chitinase.**

JEENAI. Shapiro, M. Preisler, H.K.; Robertson, J.L. Lanham, Md. : Entomological Society of America. Chitinase significantly enhanced the activity of nuclear polyhedrosis viruses (NPV) ingested by second-instar gypsy moth, *Lymantria dispar* (L.). Multiple probit regressions calculated from mortality observed at 14 and 21 d indicated that the LC50's of NPV declined 1.3-, 2.0-, 3.2-, and 5.4-fold with the addition of 0.001, 0.010, 0.10, and 1.00% chitinase, respectively. In addition, insects exposed to NPV-chitinase combinations died more rapidly than those that ingested NPV only. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1113-1116. Includes references. (NAL Call No.: DNAL 421 J822).

3939

### **Enhancement of *Sphaeropsis sapinea* stem invasion of pines by water deficits.**

PLDRA. Bachi, P.R. Peterson, J.L. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1985. v. 69 (9). p. 798-799. Includes 9 references. (NAL Call No.:

DNAL 1.9 P69P).

3940

### **Enniatins from *Fusarium avenaceum* isolated from balsam fir foliage and their toxicity to spruce budworm larvae, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae).**

JCECD. Strongman, D.B. Strunz, G.M.; Giguere, P.; Yu, C.M.; Calhoun, L. New York, N.Y. : Plenum Press. Journal of chemical ecology. Mar 1988. v. 14 (3). p. 753-764. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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### **Entomological problems in growing white pine.**

GTRWD. Houseweart, M.W. Knight, F.B. Washington, D.C. : The Service. General technical report WO - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 89-92. Includes references. (NAL Call No.: DNAL aSD11.U52).

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### **Entomosporium leaf spot.**

Hagan, A. Gilliam, C. Overland Park, Kan. : Intertec Publishing Corporation. Grounds maintenance. Apr 1987. v. 22 (4). p. 27, 30. ill. (NAL Call No.: DNAL SB476.G7).

3943

### **Environmental contamination of egg masses as a major component of transgenerational transmission of gypsy moth nuclear polyhedrosis virus (LdMNPV).**

JIVPA. Murray, K.D. Elkinton, J.S. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. May 1989. v. 53 (3). p. 324-334. Includes references. (NAL Call No.: DNAL 421 J826).

3944

### **Environmental factors involved in the growth and distribution of post oak in the southcentral United States.**

Stahle, D.W. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 54-58. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**Environmental fate of sulfometuron methyl in southern forest watersheds.**  
SWSPBE. Michael, J.L. Neary, D.G. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma.~ Includes abstract. 1988. v. 41. p. 219. (NAL Call No.: DNAL 79.9 S08 (P)).

3946

**Environmental monitoring of spruce budworm suppression programs in the eastern United States and Canada an annotated bibliography.**  
MAMRA. Trial, J.G. Orono, Me. : The Station. Miscellaneous report - University of Maine Agricultural Experiment Station. Bibliography. Apr 1986. (312). 36 p. (NAL Call No.: DNAL 100 M28M).

3947

**Enzyme immunoassays for detection of gypsy moth nuclear polyhedrosis virus.**  
XGNEA. Ma, M. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 125-131. ill. Includes references. (NAL Call No.: DNAL aSD11.U56).

3948

**Epidemiology of Fusarium on containerized Douglas-fir seedlings. Seed and seedling infection, symptom production, and disease progression /by R.L. James ... et al. .**  
James, R. L. Missoula, Mont. : U.S. Dept. of Agriculture, Forest Service, Northern Region, 1987 . Caption title.~ "December 1987."~ At head of title: Forest Pest Management. 22 p. ; 28 cm. Bibliography: p. 8. (NAL Call No.: DNAL aSD11.U585 no.87-13).

3949

**Equipment for hand and other ground application of herbicides.**  
Williamson, M. Washington, D.C. : Division of Timber Management, USDA, Forest Service, 1985? . Proceedings of the National Silviculture Workshop : successes in silviculture : Rapid City, South Dakota, May 13-16, 1985. p. 147-150. ill. (NAL Call No.: DNAL aSD391.N37 1985).

3950

**Equipment trials for uprooting root-rot-infected stumps.**  
Bloomberg, W.J. Reynolds, G. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. July 1988. v. 3 (3). p. 80-82. ill. Includes references. (NAL Call No.: DNAL SD388.W6).

3951

**Erynia crustosa zygosporangium germination.**  
MYCOAE. Perry, D.F. Fleming, R.A. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Jan/Feb 1989. v. 81 (1). p. 154-158. ill. Includes references. (NAL Call No.: DNAL 450 M99).

3952

**Erynia radicans as a mycoinsecticide for spruce budworm control.**  
XGNEA. Soper, R.S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 69-76. Includes references. (NAL Call No.: DNAL aSD11.U56).

3953

**Escort herbicide foliar directed spray for pine release.**  
SWSPBE. Gonzalez, F.E. Evans, R.M. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. 1986. (39th). p. 240-246. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

3954

**Establishment of long-term callus cultures from mature white pine (Pinus strobus, Pinaceae).**  
AJBOA. Kaul, K. Baltimore, Md. : Botanical Society of America. American journal of botany. Feb 1986. v. 73 (2). p. 242-245. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

3955

**Estimates of genetic parameters for deer browsing of Douglas-fir.**  
FOSCA. Silen, R.R. Randall, W.K.; Mandel, N.L. Bethesda, Md. : Society of American Foresters. Forest science. Literature review. Mar 1986. v. 32 (1). p. 178-184. Includes references. (NAL Call No.: DNAL 99.8 F7632).



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3956

### **Estimating and valuing western pine beetle impacts.**

FOSCA. Liebhold, A.M. Berck, P.; Williams, N.A.; Wood, D.L. Washington, D.C. : Society of American Foresters. Forest science. June 1986. v. 32 (2). p. 325-338. Includes references. (NAL Call No.: DNAL 99.8 F7632).

3957

### **Estimating cone and seed production and monitoring pest damage in southern pine seed orchards /Carl W. Fatzinger ... et al.**

Fatzinger, Carl W. Asheville, N.C. : U.S. Dept. of Agriculture, Forest Service, Southeastern Forest Experiment Station, 1988. "November 1988"--P. 2 of cover. iv, 30 p. : ill. ; 28 cm. Bibliography: p. 9. (NAL Call No.: DNAL A99.9 F7623U no.271).

3958

### **Estimating effects of competing plants on conifer growth and yield, and determining release needs.**

Fiske, J.N. S.l. : s.n. . Proceedings ... annual Forest Vegetation Management Conference. Meeting held November 1-2, 1984, Redding, California. Aug 1985. (6th). p. 129-143. Includes references. (NAL Call No.: DNAL QH541.5.F6F67).

3959

### **Estimating fusiform rust losses in five southeast states.**

SJAFD. Anderson, R.L. McClure, J.P.; Cost, N.; Uhler, R.J. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Nov 1986. v. 10 (4). p. 237-240. Includes references. (NAL Call No.: DNAL SD1.S63).

3960

### **Estimating oak leaf area index and gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), defoliation using canopy photographs.**

EVETEX. Liebhold, A.M. Elkinton, J.S.; Miller, D.R.; Wang, Y.S. College Park, Md. : Entomological Society of America. Abstract: Oak leaf area index was (LAI) was estimated using wide-angle photographs of the forest canopy taken from the ground at grid points throughout three sites on Cape Cod, Mass. Confidence intervals for these estimates and optimal sample sizes were calculated. Oak LAI estimates leveled off by early June when no defoliation was present. Within-plot two-dimensional spatial distribution of oak LAI was very similar to the spatial distribution of oak basal area. Consequently, there was a positive correlation between local oak leaf area and

local basal area. Comparison of LAI estimates taken before and after gypsy moth, *Lymantria dispar* (L.), defoliation allowed the estimation of oak leaf area consumed. Leaf area loss was similar in areas of high and low host foliage densities. The correlation of leaf area lost with local density of early instars was greater than the correlation with the density of late instars. Environmental entomology. June 1988. v. 17 (3). p. 560-566. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

3961

### **Estimating southern pine beetle caused timber losses over extensive areas.**

Ward, J.D. Dull, C.W.; Ryan, G.W.; Remion, M.C. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 34-40. ill., maps. Includes references. (NAL Call No.: DNAL aSD11.U57).

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### **Estimating the benefits of gypsy moth control on timberland.**

Gansner, D.A. Herrick, O.W. Broomall, Pa. : The Station. Forest Service research note NE-RN - Northeastern Forest Experiment Station, Forest Service, U.S. Department of Agriculture. July 1987. (337). 3 p. Includes references. (NAL Call No.: DNAL A99.9 F7622U).

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### **Estimating the response of ponderosa pine forests to fertilization.**

XGTIA. Powers, R.F. Webster, S.R.; Cochran, P.H. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 219-225. maps. Includes references. (NAL Call No.: DNAL aSD11.A48).

3964

### **Estimating timber losses from a town ant colony with aerial photographs.**

SJAFD. Moser, J.C. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1986. v. 10 (1). p. 45-47. ill. Includes references. (NAL Call No.: DNAL SD1.S63).

3965

**Ethylene production by excised sapwood of clonal eastern cottonwood and the compartmentalization and closure of seasonal wounds.**

PHYTAJ. Shain, L. Miller, J.B. St. Paul, Minn. : American Phytopathological Society. Increment cores were removed from ramets of six clones of eastern cottonwood at 3-mo intervals starting either in November, at the beginning of the dormant season, or in May, at the beginning of the growing season. By offsetting the two wounding series by 6 mo, it was possible to separate the effect of wound age from the effect of season of wounding with regard to dynamic host responses and the fungi that colonize such wounds. Production of ethylene by these cores of outer sapwood was measured 1 (et1) and 2 (et2) days after their collection and incubation in sealed containers under standardized conditions. Methane, a product of methogenic bacteria, was measured 1 day after core collection. Observations on wound closure were made at 3-mo intervals. At the time of harvest, each tree had wounds 3, 6, 9, and 12 mo old. Discoloration associated with wounds initiated during the growing season was significantly less than that associated with wounds initiated during the dormant season regardless of wound age. Clones differed in their capacity to compartmentalize wounds. Ethylene production (et1) by increment cores collected in February correlated best with the ranking of mean clonal discoloration. The seasonal course of et1 but not et2 across clones faithfully mirrored that expected for the physiological activity of sapwood; i.e., it increased significantly through February, November, August, and May. The ratios of basal (February) to maximal (May) rates of et1 ranged from 2.7 to 5.6 for better compartmentalizing clones from 1.4 to 1.7 for poorer compartmentalizing clones. It is suggested that ratios of et1 may be used to rapidly screen for superior compartmentalizing genotypes, although additional studies are necessary to confirm or refute this hypothesis. Wounds largely closed during the 3-mo period from May to August. Clones differed significantly in their rate of closure. Those with higher et2 in May tended to close more rapidly. Wound closure and compartmentalization, h. Phytopathology. Oct 1988. v. 78 (10). p. 1261-1265. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**Eucalyptus stump and basal treatment.**

Cudney, D.W. McHenry, W.B.; Elmore, C.L. S.l. : Western Society of Weed Science. Research progress report - Western Society of Weed Science. 1987. p. 83-84. (NAL Call No.: DNAL 79.9 W52R).

3967

**European hornet damage to ash and birch trees.**

JOARD. Santamour, F.S. Jr. Greene, A. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Nov 1986. v. 12 (11). p. 273-279. ill. Includes 16 references. (NAL Call No.: DNAL SB436.J6).

3968

**Evaluating the impact of sequential releases of *Cotesia melanoscela* (Hymenoptera: Braconidae) on *Lymantria dispar* (Lepidoptera: Lymantriidae).**

EVETEX. Kolodny-Hirsch, D.M. Reardon, R.C.; Thorpe, K.W.; Raupp, M.J. College Park, Md. : Entomological Society of America. Laboratory-reared *Cotesia melanoscela* (Ratzeburg) were released sequentially over 3 wk at an average level of 12,000 females per ha in three isolated mixed-hardwood woodlots infested with gypsy moth on Maryland's Eastern Shore. Southwood's area under the curve method was used to estimate generational levels of parasitism for the first three instars of the gypsy moth and rates of parasitism were estimated from gypsy moth larvae collected from various canopy strata and host tree species. Significantly higher rates of generational parasitism were achieved in release woodlots (15.4%) than in control woodlots (5.1%). *Cotesia melanoscela* parasitized a greater proportion of larvae occurring in the upper canopy of trees. Despite significantly higher rates of parasitism in release woodlots, inundative releases of the Korean strain of *C. melanoscela* failed to reduce gypsy moth populations as determined from egg mass counts. Environmental entomology. Apr 1988. v. 17 (2). p. 403-408. Includes references. (NAL Call No.: DNAL QL461.E532).

3969

**Evaluation and application of the TAMBEETLE and Arkansas southern pine beetle spot growth models in the Gulf Coastal Plain.**

Nettleton, W.A. Connor, M.D.; Ryan, G.W. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 202-205. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Evaluation of a hemlock sawfly outbreak in the northern tip of Idaho-1985.**

Tunnock, S. Missoula, Mont. : The Region. Report - USDA Forest Service, Forest Pest Management, Northern Region. Nov 1985. (85-26). 4 p. maps. Includes references. (NAL Call No.: DNAL aSD11.U585).



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**Evaluation of a repellent for prevention of attacks by three species of southern pine bark beetles (Coleoptera: Scolytidae).**

JESCEP. Berisford, C.S. Brady, U.E.; Fatzinger, C.W.; Ebel, B.H. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Oct 1986. v. 21 (4). p. 316-318. Includes references. (NAL Call No.: DNAL QL461.G4).

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**An evaluation of Arbotech and Lignasan trunk injections as potential treatments for oak wilt in live oaks.**

JOARD. Lewis, R. Jr. Brook, A.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1985. v. 11 (4). p. 125-128. Includes 7 references. (NAL Call No.: DNAL SB436.J6).

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**An evaluation of avian impact assessment techniques following broad-scale forest insecticide sprays.**

ETOC DK. Mineau, P. Peakall, D.B. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1987. v. 6 (10). p. 781-791. Includes references. (NAL Call No.: DNAL QH545.A1E58).

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**Evaluation of control measures for black stain root disease in pinyon pine in southwestern Colorado.**

Sharon, E.M. Johnson, D.W. Denver : The Service. Technical report R2 - United States Forest Service, Forest Pest Management. June 1987. (39). 9 p. Includes references. (NAL Call No.: DNAL aSD11.A422).

3975

**Evaluation of diflubenzuron as a control agent for hemlock looper (Lepidoptera: Geometridae).**

JEENAI. Retnakaran, A. Raske, A.G.; West, R.J.; Lim, K.P.; Sundaram, A. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1698-1705. ill., maps. Includes references. (NAL Call No.: DNAL 421 J822).

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**Evaluation of Dipel foliage protection program in Midland County.**

MUCBA. Smitley, D.R. Mech, R.; Melchior, G.; Vandyke, L. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the

series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 42-45. (NAL Call No.: DNAL 275.29 M58B).

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**An evaluation of dormant oil phytotoxicity on six species of woody ornamentals.**

JOARD. Baxendale, R.W. Johnson, W.T. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1988. v. 14 (4). p. 102-105. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Evaluation of Douglas-fir mortality from Douglas-fir beetle from 1982 through 1984 following MCH application.**

McGregor, M.D. Oakes, R.D.; Meyer, H.E. Missoula, Mont. : The Region. Report - USDA Forest Service, Northern Region. Mar 1985. (85-7). 9 p. Includes references. (NAL Call No.: DNAL aSD11.U585).

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**Evaluation of growth and yield responses to vegetation management of the mixed-conifer forests in the Inland Northwest.**

Stage, A.R. Boyd, R.J. Jr. New York, N.Y. : Wiley, c1987. Forest vegetation management for conifer production / edited by John D. Walstad and Peter J. Kuch. p. 295-324. ill. Includes references. (NAL Call No.: DNAL SB608.C7F6).

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**Evaluation of helicopter mounted application systems for potential spray drift.**

SWSPBE. Fears, R.D. McMaster, S.A. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 354-363. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Evaluation of herbicides for early season conifer release.**

WSWPA. Cole, E.C. Newton, M.; White, D.E. Reno, Nev. : The Society. Proceedings - Western Society of Weed Science. 1987. v. 40. p. 119-128. (NAL Call No.: DNAL 79.9 W52).

(FORESTRY RELATED)

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**Evaluation of herbicides for forest site preparation in coastal Oregon.**

Cole, E.C. Newton, M. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 89-91. (NAL Call No.: DNAL 79.9 W52R).

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**Evaluation of herbicides for herbaceous weed control in young conifer plantations in coastal Oregon.**

Cole, E.C. Newton, M. S.I. : The Society. Research progress report - Western Society of Weed Science. 1988. p. 86-88. (NAL Call No.: DNAL 79.9 W52R).

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**An evaluation of herbicides for tree injection.**

SWSPB. McLemore, B.F. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 169-175. (NAL Call No.: DNAL 79.9 S08).

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**Evaluation of herbicides on ornamental crops--1983 to 1985.**

Talbert, R.E. Guy, C.B.; Johnson, D.H. Fayetteville : The Station. Research series - University of Arkansas Agricultural Experiment Station. Apr 1986. (340). 18 p. (NAL Call No.: DNAL S541.5.A8R47).

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**Evaluation of hydraulically applied baculovirus preparations to control western spruce budworm (Lepidoptera: Tortricidae) on grand fir.**

JEENAI. Stelzer, M.J. Scott, D.W. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1105-1108. Includes references. (NAL Call No.: DNAL 421 J822).

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**Evaluation of larch casebearer parasites on the Flathead National Forest, Montana--1985.**

Tunnock, S. Bousfield, W. Missoula, Mont. : The Region. Report - USDA Forest Service, Forest Pest Management, Northern Region. Oct 1985. (85-24). 4 p. Includes references. (NAL Call No.: DNAL aSD11.U585).

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**An evaluation of methods for assessing impacts of pests on forest productivity.**

XFGTA. Froelich, R.C. Miller, T.; Belanger, R.P. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the "Conference on Forest Growth Modelling and Prediction," Aug 23-27, 1987, Minneapolis, Minnesota. 1988. (120). p. 458-466. Includes references. (NAL Call No.: DNAL aSD11.A352).

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**Evaluation of methyl bromide, Basamid granular, and solar heating for pre-planting pest control for fall-sown eastern redcedar at Bessey Nursery.**

Hildebrand, D.M. Dinkel, G.B. Denver : The Service. Technical report R2 - United States Forest Service, Forest Pest Management. Jan 1988. (41). 13 p. Includes references. (NAL Call No.: DNAL aSD11.A422).

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**An evaluation of metribuzin slow-release herbicide tablets on woody landscape crops.**

DARCB. Smith, E.M. Gorski, S.F.; Moore, M. Wooster, Ohio : The Center. Research circular - Ohio Agricultural Research and Development Center. Jan 1986. (289). p. 14-17. Includes references. (NAL Call No.: DNAL 100 OH3R).

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**An evaluation of physical properties droplet spectra, ground deposits and soil residues of aerially applied aminocarb and fenitrothion emulsions in conifer forests in New Brunswick.**

JPFCD2. Sundaram, A. Sundaram, K.M.S.; Cadogan, B.L.; Nott, R.; Leung, J.W. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. Dec 1985. v. 20 (6). p. 665-688. ill. Includes references. (NAL Call No.: DNAL TD172.J61).

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**Evaluation of postemergence grass herbicides in conifer seedbeds and Christmas trees.**

PNWSB. Ahrens, J.F. Cubanski, M. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1985. v. 39. p. 243-246. Includes 2 references. (NAL Call No.: DNAL 79.9 N814).



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### **An evaluation of root-wrenched and stored loblolly pine seedlings.**

Hammer, M.F. Ray, K.F.; Miller, A.E. Auburn, Ala.? : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 351-362. Includes references. (NAL Call No.: DNAL SD397.P55I58 1985).

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### **Evaluation of (S)-verbenone applications for suppressing southern pine beetle (Coleoptera: Scolytidae) infestations.**

JEENAI. Payne, T.L. Billings, R.F. Lanham, Md. : Entomological Society of America. Field tests were conducted to evaluate the efficacy of various applications of the beetle-produced, inhibitory compound (S)-verbenone for suppressing infestations of the southern pine beetle, *Dendroctonus frontalis* Zimmermann. Twenty-four expanding infestations (spots), ranging in size from 22 to 140 active trees, and representing a variety of stand conditions, were treated with one of five different applications. Treatments included: (A) (S)-verbenone applied at the rate of 4 ml per tree, (B) (S)-verbenone applied at 8 ml per tree, (C) (S)-verbenone at 8 ml per tree in combination with felling all freshly-attacked trees, and the preliminary treatments; (D) (S)-verbenone in combination with the attractant frontalin, and (E) (S)-verbenone plus frontalin, plus felling all infested trees. In all treatments, (S)-verbenone was mixed with a sustained release liquid polymer and applied to a horseshoe-shaped buffer of uninfested trees at the advancing head of the infestation. To draw emerging beetles away from the advancing head, in Treatments D and E, frontalin, a beetle-produced attractant, was applied in the center of the infestation to nonhost trees or to host trees previously infested by beetles. To measure treatment efficacy, rates of spot growth following treatment were compared with pretreatment infestation growth rates. Observed rates of spot growth before and after treatment were compared with spot growth projections generated by a southern pine beetle spot growth prediction model. Results showed that Treatment C was the most effective and practical treatment tested. Spot growth in all five infestations treated with this application was completely halted with few or no additional trees being attacked. Treatment B proved relatively effective in slowing rates of spot growth in small or moderate-sized spots. Treatment E was effective in completely halting spot growth in two large infestations in sawtimber stands, but the treatment required the use of two behavioral. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1702-1708. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Evaluation of sulfometuron methyl for weed control in Christmas tree plantings.**

PNWSB. Ahrens, J.F. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1985. v. 39. p. 249-253. Includes 3 references. (NAL Call No.: DNAL 79.9 N814).

3996

### **Evaluation of the dye marker Sudan Red 7B with *Reticulitermes flavipes* (Isoptera: Rhinotermitidae).**

SDCID. Grace, J.K. Abdallay, A. Chico, Calif. : California State University, Department of Biological Sciences. *Sociobiology*. 1989. v. 15 (1). p. 71-77. Includes references. (NAL Call No.: DNAL QH549.S6).

3997

### **Evaluation of the influence of droplet size and density of *Bacillus thuringiensis* against gypsy moth larvae (Lepidoptera: Lymantriidae).**

JEENAI. Bryant, J.E. Yendol, W.G. Lanham, Md. : Entomological Society of America. A study was conducted to determine the effect of spray droplet size and density on the efficacy of a commercial preparation of *Bacillus thuringiensis* against the gypsy moth (*Lymantria dispar* L.). A concentration of 5,795 International Units (IU)/microliter was used. In the laboratory, various size droplets and densities were tested against larvae using 12-cm<sup>2</sup> red oak leaflets. Results show that producing relatively high densities of small (50-150 micrometers) droplets of *B. thuringiensis* will increase the efficacy compared with larger droplets (greater than 150 micrometers) present at low densities at the same dose. Median lethal dose estimates are made for droplets in three size classes (50-150, 150-250, and 250-350 micrometers). LD95's for the generalized size classes of 100, 200, and 300 micrometers were 10.8, 2.2, and 0.9 drops/cm<sup>2</sup>, respectively. Implications of these results are discussed. *Journal of economic entomology*. Feb 1988. v. 81 (1). p. 130-134. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Evaluation of the overwintering success of two European microsporidia inoculatively released into gypsy moth populations in Maryland.**

JIVPA. Jeffords, M.R. Maddox, J.V.; McManus, M.L.; Webb, R.E.; Wieber, A. Duluth, Minn. : Academic Press. *Journal of invertebrate pathology*. Mar 1989. v. 53 (2). p. 235-240. Includes references. (NAL Call No.: DNAL 421 J826).

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Evaluation of thinning for reduction of losses from southern pine beetle attack in loblolly pine stands.

SJAFD. Burkhardt, H.E. Haney, H.L. Jr.; Newberry, J.D.; Leuschner, W.A.; Morris, C.L.; Reed, D.D. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1986. v. 10 (2). p. 105-108. Includes references. (NAL Call No.: DNAL SD1.S63).

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Evaluation of two herbicide techniques on electric transmission rights-of-way: development of relatively stable shrublands.

EMNGD. Dreyer, G.D. Niering, W.A. New York : Springer-Verlag. Environmental management. Jan 1986. v. 10 (1). p. 113-118. Includes references. (NAL Call No.: DNAL HC79.E5E5).

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Evidence of a polymorphic life cycle in the hemlock woolly adelgid, *Adelges tsugae* (Homoptera: Adelgidae).

AESAAI. McClure, M.S. Lanham, Md. : The Society. Annals of the Entomological Society of America. Jan 1989. v. 82 (1). p. 50-54. maps. Includes references. (NAL Call No.: DNAL 420 EN82).

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Evidence of pine growth loss in Forest Service inventory data.

Sheffield, R.M. Cost, N.D. Blacksburg, VA : Society of American Foresters, 1986. Atmospheric deposition and forest productivity : proceedings of the Fourth Regional Technical Conference at the Sixty-fifth Annual Meeting of the Appalachian Society of American Foresters, Raleigh, NC, Jan. 29-31, 1986. p. 74-85. maps. Includes references. (NAL Call No.: DNAL SD387.E58A66 1986).

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An examination of the growth substance activity of vitamin D3.

JPGRDI. Schmid, A. Buchala, A.J. New York, N.Y. : Springer. Journal of plant growth regulation. 1987. v. 5 (3). p. 175-180. Includes references. (NAL Call No.: DNAL QK745.J6).

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Experimental studies of ponderosa pine. II. Quantitative genetics of morphological traits.

AJB0AA. Grant, M.C. Linhart, Y.B.; Monson, R.K. Columbus, Ohio : Botanical Society of America. American journal of botany. July 1989. v. 76 (7). p. 1033-1040. Includes references. (NAL Call No.: DNAL 450 AM36).

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Experimental studies of ponderosa pine. III. Differences in photosynthesis, stomatal conductance, and water-use efficiency between two genetic lines.

AJB0AA. Monson, R.K. Grant, M.C. Columbus, Ohio : Botanical Society of America. American journal of botany. July 1989. v. 76 (7). p. 1041-1047. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

4006

An experimental study of the effect of group size on larval growth and survivorship in the imported willow leaf beetle, *Plagioderma versicolora* (Coleoptera: Chrysomelidae).

EVETEX. Breden, F. Wade, M.J. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1987. v. 16 (5). p. 1082-1086. Includes references. (NAL Call No.: DNAL QL461.E532).

4007

Exploration for and importation of natural enemies of the gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), in North America: an update.

PESWA. Coulson, J.R. Fuester, R.W.; Schaefer, P.W.; Ertle, L.R.; Kelleher, J.S.; Rhoads, L.D. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. Literature review. July 1986. v. 88 (3). p. 461-475. Includes references. (NAL Call No.: DNAL 420 W27).

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Explorations of mechanisms regulating ectomycorrhizal colonization of boron-fertilized pine quarterly report, period covered 8/20/86-3/31/87 /principal investigator, Harold E. Garrett.

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**Exposure of applicators to monosodium methanearsonate and cacodylic acid in forestry.**  
ACSMC. Norris, L.A. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. 1985. (273). p. 109-121. Includes 13 references. (NAL Call No.: DNAL QD1.A45).

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**Exposure of forestry ground workers to 2,4-D, picloram and dichlorprop.**  
ETOC DK. Lavy, T.L. Norris, L.A.; Mattice, J.D.; Marx, D.B. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1987. v. 6 (3). p. 209-224. Includes references. (NAL Call No.: DNAL QH545.A1E58).

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**Extraction of areas infested by pine bark beetle using Landsat MSS data.**  
PERSD. Mukai, Y. Sugimura, T.; Watanabe, H.; Wakamori, K. Falls Church, Va. : American Society of Photogrammetry and Remote Sensing. Photogrammetric engineering and remote sensing. Jan 1987. v. 53 (1). p. 77-81. ill., maps. Includes references. (NAL Call No.: DNAL 325.28 P56).

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**Factors contributing to southern pine beetle host resistance.**  
Hain, F.P. Cook, S.P.; Matson, P.A.; Wilson, K.G. New Orleans, La. : The Station. Forest Service general technical report S0 - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 154-160. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Factors influencing suitability of elms for elm leaf beetle, *Xanthogaleruca luteola* (Coleoptera: Chrysomelidae).**  
EVETEX. Young, C.E. Hall, R.W. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1986. v. 15 (4). p. 843-849. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Fall-lifted Douglas-fir outperforming spring-lifted stock 13 years after planting.**  
TPLNA. Sloan, J.P. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1989. v. 40 (3). p. 20-24. ill. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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**Fall site prep with tordon and garlon herbicides.**  
SWSPB. Kidd, F.A. Kline, W.N. III; Hern, L.K. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 206-212. Includes 4 references. (NAL Call No.: DNAL 79.9 S08).

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**Fate of hexazinone in southern forest watersheds.**  
Atlanta : The Service. Forestry bulletin R8-FB/P - United States Department of Agriculture, Forest Service, Southeastern Area, State and Private Forestry. July 1985. (9, rev.). 2 p. Includes references. (NAL Call No.: DNAL aSD11.U594).

4017

**Fate of pesticides in Florida's forests: an overview of potential impacts on water quality.**  
Neary, D.G. S.I. : The Society. Proceedings - Soil and Crop Science Society of Florida. 1985. v. 44. p. 18-24. maps. Includes references. (NAL Call No.: DNAL 56.9 S032).

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**A faunal survey of spiders associated with *Pinus radiata* in a southern California farm.**  
JARCD. Ali, A.D. Hartin, J.S. Lubbock, Tex. : American Arachnological Society. The journal of arachnology. Summer 1988. v. 16 (2). p. 269-272. Includes references. (NAL Call No.: DNAL QL451.J6).

4019

**Feasibility of using ectomycorrhizal fungi to alleviate drought-related problems of containerized black spruce contractor's final report /contractor: D. Boyle, scientific authority: P.O. Saloni.**  
Boyle, D. Saloni, P. O. Ottawa? : Federal Panel on Energy Research and Development? , 1988. "DSS contract: file no. 15SC.01K26-6-0167, serial no.

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**Feeding preferences of eastern spruce budworm larvae in two-choice tests with extracts of mature foliage and with pure amino acids.**  
JCECD. Albert, P.J. Parisella, S. New York, N.Y. : Plenum Press. Journal of chemical ecology. Aug 1988. v. 14 (8). p. 1649-1656. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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**Fenitrothion and aminocarb residues in water and balsam fir foliage following spruce budworm spraying programs in Quebec, 1979 to 1982.**  
BECTA. Morin, R. Gaboury, G.; Mamarbachi, G. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Apr 1986. v. 36 (4). p. 622-628. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

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**Fenuron converts low-grade hardwoods to Japanese larch.**  
PNWSB. Shipman, R.D. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1987. v. 41. p. 179-182. Includes references. (NAL Call No.: DNAL 79.9 N814).

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**Fertilization and competition control accelerate early southern pine growth on flatwoods.**  
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TPLNA. Hammitt, W.E. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1989. v. 40 (3). p. 29-32. ill. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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NEPHA. Norby, R.J. O'Neill, E.G. New York, N.Y. : Cambridge University Press. The New phytologist. Mar 1989. v. 111 (3). p. 491-500. Includes references. (NAL Call No.: DNAL 450 N42).

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**Growth following thinning model for loblolly pine plantations infected by annosus root rot.**  
Hokans, R.H. Fanelli, E.S.; Alexander, S.A. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 59-61. Includes references. (NAL Call No.: DNAL aSD11.U57).

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FDSCA. Bloomberg, W.J. Reynolds, G. Bethesda, Md. : Society of American Foresters. Forest science. June 1985. v. 31 (2). p. 497-508. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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JRMGA. Uresk, D.W. Yamamoto, T. Denver, Colo. : Society for Range Management. Journal of range management. Mar 1986. v. 39 (2). p. 113-117. Includes references. (NAL Call No.: DNAL 60.18 J82).

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effect of host plant species on parasitism was independent of the number of eggs per mass and may be due to the effects of bark texture one egg mass geometry and searching behavior of O. kuvanae. Percent parasitization was also inversely related to eggs per mass; the latter is a function of host suitability and gypsy moth population density. O. kuvanae appears to be incapable of maintaining gypsy moth populations at low densities but may be an additional factor mediating against the reproductive success of individuals feeding on nonpreferred host plant species. Environmental entomology. Dec 1988. v. 17 (6). p. 936-940. Includes references. (NAL Call No.: DNAL QL461.E532).

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XFGSA. Connor, M.D. Starkey, D.A.; Nettleton, W.A.; Fort, J.; Weaver, S.; Uhler, R.J.; White, M.N. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 21-30. maps. Includes references. (NAL Call No.: DNAL ASD433.A53).

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EVETEX. Tilles, D.A. Hordlander, G.; Nordenhem, H.; Eidmann, H.H.; Wassgren, A.B.; Bergstrom, G. College Park, Md. : Entomological Society of America. Environmental entomology. Oct 1986. v. 15 (5). p. 1050-1054. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

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SJAFD. Cantrell, R.L. Flinchum, D.M.; Neary, D.G. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1986. v. 10 (3). p. 131-134. Includes references. (NAL Call No.: DNAL SD1.S63).

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AMNTA. Barbosa, P. Krischik, V.A. Chicago, Ill. : University of Chicago Press. The American naturalist. July 1987. v. 130 (1). p. 53-69. Includes references. (NAL Call No.: DNAL 470 AM36).

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FDSCA. Petersen, T.D. Newton, M.; Zedaker, S.M. Bethesda, Md. : Society of American Foresters. Abstract: Stem dimensions for two age groups of Douglas-fir growing in the central Cascade Mountains of western Oregon were related to water-stress and the amount of interference from dense Ceanothus velutinus and forbs 8 years earlier. In 1978, three regimes were established in four 5-year-old and four 10-year-old stands by means of controls (no treatment) and two herbicide treatments to individual trees in each stand: a partial treatment (C. velutinus eliminated) and a complete treatment (both shrubs and forbs eliminated). In the subsequent year, soil water potential during late summer was less than -1.5 MPa at 10-, 40-, and 100-cm depths, where C. velutinus was growing with forbs. In the absence of shrubs and forbs, soil water potential at 100 cm was near field capacity throughout the 1979 growing season. Predawn stem water potential and Douglas-fir during late summer was significantly lower for trees competing with C. velutinus and forbs than for trees without competitors in the complete treatment, or for trees competing with forbs in the partial treatment, in the four 5-year-old stands and in two of the 10-year-old stands. By 1986, Douglas-fir stems were 2 to 6 cm larger in basal diameter and 1 to 2 m taller in the absence of competitors. Interference from C. velutinus and forbs had a greater effect on stem size of 5-year-old than 10-year-old trees. The correlation between growth and water stress suggests that interspecific competition for soil water during summer drought is a factor limiting stemwood production. FOR. SCI. 34(2):333-343. Forest science. June 1988. v. 34 (2). p. 333-343. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Influence of disease management strategies on the production of white spruce in a forest tree nursery.**

FDSCA. Enebak, S.A. Palmer, M.A.; Blanchette, R.A. Bethesda, Md. : Society of American Foresters. In a forest tree nursery dazomet, captan, thiram, captan-thiram combination, or silica sand did not reduce populations of three soilborne fungi. Preemergence mortality was greatest in nontreated plots, (56%) and least in plots treated with dazomet (46%). Nontreated plots had the most post-emergence damping off, (15%) and silica sand the least (3%). Rhizoctonia solani (AG-1) was isolated from 52% of damped-off seedlings collected while Pythium spp., Fusarium spp. and Cylindrocladium spp. were recovered from 24%, 23%, and 1% of the seedlings, respectively. Seedling mortality from May 18 to September 23, 1986, ranged from 28% in the dazomet plots to 61% in nontreated plots. At the end of the first growing season, plots treated with dazomet had significantly more seedlings than any other treatment. The incidence of stunted seedlings was greatest in plots treated with dazomet and least when seed was covered with silica sand. Silica sand or thiram treatments produced seedlings with the greatest total dry weights. Forest science. Dec 1989. v. 35 (4). p. 1006-1013. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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XGTIA. Sutherland, J.R. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Paper presented at the "Conifer Tree Seed in the Inland Mountain West Symposium," August 5-6, 1985, Missoula, Montana. Apr 1986. (203). p. 260-266. Includes references. (NAL Call No.: DNAL aSD11.A48).



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Nebeker, T.E. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 52-59. Includes references. (NAL Call No.: DNAL 99.9 L935).

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**Influence of formulation properties on droplet spectra and soil residues of aminocarb aerial sprays in conifer forests.**  
JPFC2. Sundaram, A. Sundaram, K.M.S.; Cadogan, B.L. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1985. v. 20 (2). p. 167-186. ill. Includes references. (NAL Call No.: DNAL TD172.J61).

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EVETEX. Kard, B.M.R. Hain, F.P. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1988. v. 17 (1). p. 63-66. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Influence of host genotype on Douglas-fir seed losses to *Contarinia oregonensis* (Diptera: Cecidomyiidae) and *Megastigmus spermatrophus* (Hymenoptera: Torymidae) in western Oregon.**  
EVETEX. Schowalter, T.D. Haverty, M.I. Lanham, Md. : Entomological Society of America. Seed losses to the Douglas-fir cone gall midge, *Contarinia oregonensis* Foote, and Douglas-fir seed chalcid, *Megastigmus spermatrophus* (Wachtl), were measured in a Douglas-fir, *Pseudotsuga menziesii* (Mirbel) Franco, clonal seed orchard and in a Douglas-fir progeny plantation in western Oregon. Seed losses to both insects differed significantly ( $P$  less than 0.05) among clones and among the progeny of selected parental crosses. Seed loss differed more than three times between least-infested and most-infested clones or progeny. Seed losses in the progeny plantation indicated that resistance to these two insects is a heritable trait, with greater resistance showing a tendency to dominate over lesser resistance. Insect responses to host genotype may be modified by factors associated with the position of the tree within the stand. Implications of these results for tree improvement programs and seed orchard management are discussed. Environmental entomology. Feb 1989. v. 18. p. 94-97. Includes references. (NAL Call No.: DNAL QL461.E532).

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JESCEP. Akers, R.C. Nielsen, D.G. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Jan 1986. v. 21 (1). p. 63-67. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Influence of pruning at transplant time on growth and establishment of *Liquidambar styraciflua* L., sweet gum.**

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**Influence of selected host plants on gypsy moth (Lepidoptera: Lymantriidae) larval mortality caused by a baculovirus.**

EVETEX. Keating, S.T. Yendol, W.G. Lanham, Md. : Entomological Society of America. Larvae of gypsy moth, *Lymantria dispar* (L.), were fed gypsy moth nuclear polyhedrosis virus on selected host plants to study influence of host plants on larval mortality. Larvae consuming the virus on red oak, *Quercus rubra* L., or red maple, *Acer rubrum* L., showed significantly lower mean mortality due to the virus than did larvae fed virus on quaking aspen, *Populus tremuloides* Michx., or pitch pine, *Pinus rigida* Mill. Mean viral mortalities for larvae fed red oak, red maple, pitch pine, and quaking aspen were 32.0, 35.4, 44.4, and 49.7%, respectively. Environmental entomology. Apr 1987. v. 16 (2). p. 459-462. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Influence of site disturbance on delta 13C isotopic time series from tree rings.**

Leavitt, S.W. Long, A. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 119-129. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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XGNEA. Haynes, D.L. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 203-208. ill., maps. Includes references. (NAL Call No.: DNAL aSD11.U56).

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JLPSA. Ghidui, G.M. Vasvary, L.; Eichlin, T.D.; Solomon, J.D. Los Angeles, Calif. : The Society. Journal of the Lepidopterists' Society. Oct 7, 1987. v. 41 (3). p. 154-158. ill. Includes references. (NAL Call No.: DNAL 421 L554).

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Adams, D. Moscow, Idaho : The Station. Focus on renewable natural resources - University of Idaho, Forest, Wildlife and Range Experiment Station. May 1988. v. 13. p. 15-16. ill. (NAL Call No.: DNAL S916.I2F6).

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### **Insect and disease conditions in the United States, 1979-83 what else is growing in our forests? / edited by Robert C. Loomis, Susan Tucker, and Thomas H. Hofacker ; United States Dept. of Agriculture, Forest Service, State and Private Forestry, Forest Pest Management.**

Loomis, Robert C.; Tucker, Susan.; Hofacker, Thomas H. Washington, D.C. : The Service, 1985. Cover title. ~ "October 1985" -- P. i. ii, 93 p. : col. ill., maps ; 28 cm.

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XGTIA. Johns, W.F. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. Paper presented at the "Conifer Tree Seed in the Inland Mountain West Symposium," August 5-6, 1985, Missoula, Montana. Apr 1986. (203). p. 251. (NAL Call No.: DNAL aSD11.A48).

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**Introduction and North American establishment of *Coccygomimus disparis* (Hymenoptera: Ichneumonidae), a polyphagous pupal parasite of Lepidoptera, including gypsy moth.**

EVETEX. Schaefer, P.W. Fuester, R.W.; Chianese, R.J.; Rhoads, L.D.; Tichenor, R.B. Jr. Lanham, Md. : Entomological Society of America. Recoveries of *Coccygomimus disparis* (Viereck) from pupae of gypsy moth, *Lymantria dispar* (L.), in Pennsylvania, Maryland, New Jersey, Massachusetts, Virginia, Vermont, New York, Nebraska, and Ontario, Canada, indicate that this Palearctic species is now well established in North America. This represents the first successful establishment of a natural enemy of gypsy moth in North America in nearly 50 yr. Levels of pupal parasitism in gypsy moth average 1.9% (maximum 13%). Historical records indicate *C. disparis* was intentionally imported from India (1972), Japan (1976), and Korea (1984). Laboratory rearing resulted in the eventual release of more than 819,012 individuals liberated in 16 states. Details on the biology of this wasp, its foreign collection, introduction, release, and recovery (first in North America in 1978) are documented. Recovery from *Thyridopteryx ephemeraeformis* (Haworth) (Psychidae) and *Malacosoma americanum* (F.) (Lasiocampidae) in New Jersey and *Dioryctria auranticella* (Grote) (Pyrallidae) from Nebraska, as well as host data from outside the United States, indicates that *C. disparis* is not specific to gypsy moth and should be searched for in other forest or shade tree Lepidoptera. Recent collections of *M. americanum* in New Jersey showed 20.6% parasitism. Overall effectiveness as a biological control agent against the gypsy moth or other hosts remains uncertain but promising. Environmental entomology. Dec 1989. v. 18 (6).



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Erb, C. University Park, Pa. : Pennsylvania State University. PennState agriculture. Fall 1987. p. 3-11. ill. (NAL Call No.: DNAL S451.P4P45).

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### **Knowledge system environment for integrated pest management in forest landscapes: the southern pine beetle (Coleoptera: Scolytidae).**

Coulson, R.N. Saunders, M.C.; Loh, D.K.; Oliveria, F.L.; Drummond, D.; Barry, P.J.; Swain, K.M. Lanham, Md. : The Society. Bulletin of the Entomological Society of America. Summer 1989. v. 35 (2). p. 26-32. Includes references. (NAL Call No.: DNAL 423.9 EN8).

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### **Kudzu eradication trials testing fifteen herbicides.**

SWSPBE. Miller, J.H. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 276-281. (NAL Call No.: DNAL 79.9 S08 (P)).

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### **Laboratory assessment of predation by *Lonchaea corticis* (Diptera: Lonchaeidae) on *Pissodes strobi* (Coleoptera: Curculionidae).**

EVETEX. Hulme, M.A. Lanham, Md. : Entomological Society of America. Larvae of *Lonchaea corticis* Taylor killed and consumed pupae and to a lesser extent prepupal larvae of *Pissodes strobi* (Peck) at temperatures ranging from 5 to 14 degrees C during a 3-wk experiment in glass vials that were monitored weekly. Marginal predation of pupae but not prepupal larvae was observed at 0 degrees C. In simulated pupal cells of *P. strobi* stored outdoors in a Victoria, British Columbia, winter, *L. corticis* larvae killed and consumed pupae and prepupal larvae of *P. strobi* in a 3-wk experiment that left most cells devoid of obvious prey remains. Tests in glass vials in March with *L. corticis* larvae collected during March and during the previous August showed that *L. corticis* larvae remain predacious at the end of winter. When the insects were left in situ in severed leaders stored outdoors in a Victoria, British Columbia, winter, the proportion of pupal cells with live *P. strobi* decreased significantly and the proportion of pupal cells emptied without insect emergence increased significantly; the numbers of *L. corticis* larvae and total *P. strobi* pupal cells did not change significantly. These experiments show that *P. strobi* pupae and prepupal larvae can be vulnerable prey for *L. corticis* larvae and that predation may be common in the winter conditions of coastal British Columbia. Environmental entomology. Dec 1989. v. 18 (6). p. 1011-1014. Includes references. (NAL Call No.: DNAL QL461.E532).

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### **Laboratory comparisons of sulfuryl fluoride toxicity and mean time of mortality among ten termite species (Isoptera: Hodotermitidae, Kalotermitidae, Rhinotermitidae).**

JEENAI. Osbrink, W.L.A. Scheffrahn, R.H.; Su, N.Y.; Rust, M.K. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1987. v. 80 (5). p. 1044-1047. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Laboratory evaluation of new ultraviolet absorbers for protection of Douglas-fir tussock moth (Lepidoptera: Lymantriidae) *Baculovirus*.**

JEENAI. Martignoni, M.E. Iwai, P.U. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1985. v. 78 (4). p. 982-987. ill. Includes references. (NAL Call No.: DNAL 421 J822).

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**Laboratory evaluation of phosalone for control of western spruce budworm (Lepidoptera: Tortricidae).**

JESCEP. Robertson, J.L. Preisler, H.K. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. Oct 1988. v. 23 (4). p. 374-378. Includes references. (NAL Call No.: DNAL QL461.G4).

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**Laboratory evaluation of selected chemicals as antidesiccants for the protection of the entomogenous nematode, Steinernema feltiae (Rhabditidae: Steinernematidae), against Lymantria dispar (Lepidoptera: Lymantriidae).**

JEENAI. Shapiro, M. McLane, W.; Bell, R. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1985. v. 78 (6). p. 1437-1441. Includes references. (NAL Call No.: DNAL 421 J822).

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**Laboratory measurements of ozone removal by plants, and application to rural ozone records.**

Steinberger, E.H. Wurtele, M.G. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology. May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 400-403. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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**Laboratory rearing of Tetrastichus gallerucae (Hymenoptera: Eulophidae), an egg parasitoid of the elm leaf beetle (Coleoptera: Chrysomelidae).**

JEENAI. Hamerski, M.R. Hall, R.W. College Park, Md. : Entomological Society of America. Rearing of Tetrastichus gallerucae (Fonscolombe), a parasitoid of the elm leaf beetle, Xanthogaleruca luteola (Muller), was conducted at 15:9 (L:D) photoperiod, 25°C, and 80-90% relative humidity. Under these conditions, adult males lived for an average of 23 d and females for 59 d when fed a 1:1 water-honey mixture. Adult T. gallerucae began to emerge from elm leaf beetle egg masses 28 d after exposure to T. gallerucae when held at 20°C, 12 d at 25°C, 11 d at 27°C, and 10 d at 30°C. Peak emergence occurred after 13 d at 25°C. Male T. gallerucae emerged first, remained close to the egg mass, and mated with their sisters. T. gallerucae exhibited a female-biased sex ratio. T. gallerucae would parasitize elm leaf beetle eggs that were between 1 and 104 h old at 25°C. Parasitization of egg masses exposed to single females for 48 h averaged 44.9%. Percent parasitization of eggs within parasitized masses ranged from 3.5 to 100 (-/x = 53.1%). Host feeding by female T. gallerucae destroyed approximately 65% of the eggs presented. The

number of eggs in an egg mass and the number of parasitized eggs in a mass had no effect on the percentage of males produced. Journal of economic entomology. Oct 1988. v. 81 (5). p. 1503-1505. Includes references. (NAL Call No.: DNAL 421 J822).

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**Landscape and visual management concerns.**

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**Large infection center of scleroderris canker (European race) in Quebec Province.**

PLDIDE. Laflamme, G. Lachance, D. St. Paul, Minn. : American Phytopathological Society. Plant disease. Nov 1987. v. 71 (11). p. 1041-1043. maps. Includes references. (NAL Call No.: DNAL 1.9 P69P).



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**The large-scale prediction of southern pine beetle populations.**

Mawby, W.D. Hain, F.P. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 53-55. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Large scalps improve survival and growth of planted conifers in central Idaho.**

XFIPA. Sloan, J.P. Ryker, R.A. Ogden, Utah : The Station. USDA Forest Service research paper INT - United States, Intermountain Forest and Range Experiment Station. June 1986. (366). 9 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764U).

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**Larvicides for black vine weevil on woody ornamentals.**

Halfhill, J.E. Clemson, S.C. : South Carolina Entomological Society. Journal of agricultural entomology. July 1985. v. 2 (3). p. 292-296. Includes references. (NAL Call No.: DNAL SB599.U69).

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**Laws and regulations pertaining to forestry herbicide contractors.**

Ezell, A. Atlanta, GA : USDA Forest Service, Southern Region, 1988. A Manual on ground applications of forestry herbicides / edited by James H. Miller, Robert J. Mitchell. p. 10/1-10/8. (NAL Call No.: DNAL aSB951.4.M36).

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**Leaf area, stemwood growth, and nutrition relationships in loblolly pine.**

FDSCA. Vose, J.M. Allen, H.L. Bethesda, Md. : Society of American Foresters. The relationships among loblolly pine (*Pinus taeda* L.) stand leaf area index (LAI), stemwood volume growth (m3/ha/yr), and growth efficiency

(m3 stemwood/ha/yr/LAI) were examined in three nitrogen (N) by phosphorus (P) fertilization field trials. Prior to fertilization, stocking levels and nitrogen limitations varied for the three stands. LAI increased significantly (up to 60%) following N fertilization on the two N deficient stands. Phosphorus additions did not affect LAI. Stemwood growth was positively and linearly related to LAI across treatments and stands. Variations in LAI across stands reflected the differences in stocking and N availability. On average, a unit of LAI produced 7.3 m3 stemwood/ha/yr. Growth efficiency was not affected by fertilization on two of the three stands. A decrease in growth efficiency at a projected LAI above 3.5 resulted from an asymptotic relationship between stemwood growth and LAI on a stand that was fully stocked and highly responsive to N fertilization. The use of LAI as an index of stocking is proposed because LAI intergrates tree size, stand density, and site resource supply. In addition, it is proposed that the deviation of a stand's current LAI from the maximum supportable LAI based on fixed site factors (e.g., water, temperature) may provide a good measure of a stand's potential responsiveness to fertilization. For. Sci. 34(3):547-563. Forest science. Sept 1988. p. 547-563. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Leaf-to-twigg transfer conserves nitrogen and phosphorus in nutrient poor and enriched cypress swamps.**

FDSCA. Dierberg, F.E. Straub, P.A.; Hendry, C.D. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 900-913. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Leafminers, early leaf abscission, and parasitoids: a tritrophic interaction.**

ECOLA. Kahn, D.M. Cornell, H.V. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Oct 1989. v. 70 (5). p. 1219-1226. Includes references. (NAL Call No.: DNAL 410 EC7).

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**Learning from the legacy of Leopold Trouvelot.**

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**Lepesoma lecontei (Coleoptera: Curculionidae): an agent of conelet abortion in a Douglas-fir seed orchard in western Oregon.**

JEENAI. Schowalter, T.D. College Park, Md. : Entomological Society of America. Journal of economic entomology. June 1986. v. 79 (3). p. 843-846. ill. Includes references. (NAL Call No.: DNAL 421 J822).

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**Leptoglossus corculus and Leptoglossus occidentalis (Hemiptera: Coreidae) attacking red pine, Pinus resinosa, cones in Wisconsin and Minnesota.**

GRLEA. Katovich, S.A. Kulman, H.M. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Autumn 1987. v. 20 (3). p. 119-120. Includes references. (NAL Call No.: DNAL QL461.M5).

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**Leptographium procerum as a pathogen of pines.**

Alexander, S.A. Horner, W.E.; Lewis, K.J. St. Paul, Minn. : APS Press, 1988. Leptographium root diseases on conifers / edited by T.C. Harrington and F.W. Cobb, Jr. p. 97-112. (NAL Call No.: DNAL SB608.C7L46).

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**Leptographium species associated with root disease of conifers in British Columbia.**

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**Leptographium wagneri, cause of black-stain root disease: a review of its discovery, occurrence and biology with emphasis on pinyon and ponderosa pine.**

Cobb, F.W. Jr. St. Paul, Minn. : APS Press, 1988. Leptographium root diseases on conifers / edited by T.C. Harrington and F.W. Cobb, Jr. p. 41-62. ill. (NAL Call No.: DNAL SB608.C7L46).

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**Lethal and sublethal effects of Avermectin B1 on the western spruce budworm (Lepidoptera: Tortricidae).**

JEENAI. Robertson, J.L. Richmond, C.E.; Preisler, H.K. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1985. v. 78 (5). p. 1129-1132. Includes references. (NAL Call No.: DNAL 421 J822).

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**Levels-of-growing-stock cooperative study in Douglas-fir. Report no. 8. The LOGS study: twenty-year results.**

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**Life history, damage, and gall development of the gall midge, Neolasioptera brevis (Diptera: Cecidomyiidae), injurious to honeylocust in Michigan.**

GRLEA. Wilson, L.F. Heaton, G.C. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Autumn 1987. v. 20 (3). p. 111-118. ill. Includes references. (NAL Call No.: DNAL QL461.M5).

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**Life history of a ponderosa pine coneworm, Dioryctria auranticella (Lepidoptera: Pyralidae).**

JEENAI. Pasek, J.E. Dix, M.E. Lanham, Md. : Entomological Society of America. Dioryctria auranticella (Grote), a coneworm that infests ponderosa pine, Pinus ponderosa Douglas ex P. Lawson and Lawson, and Austrian pine, P. nigra Arnold, in southeastern Nebraska is univoltine. Head capsule measurements indicate five instars. First instars apparently overwinter in hibernaculae. Second and third instars feed in male and female pine flowers during early May. Fourth and fifth instars tunnel in second-year cones for about 2-3 wk between mid-May and mid-June and often require two cones to complete development. Larvae pupate within



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cones during June, and adults are active from mid-June to late July. At 26 degrees C, eggs hatch in 6-9 d. *Ichneumon brunneri* Rohwer was the most abundant of eleven parasite species reared from cones damaged by *D. auranticella*. *Journal of economic entomology*. June 1989. v. 82 (3). p. 879-885. Includes references. (NAL Call No.: DNAL 421 J822).

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AMNAA. Baird, W.V. Riopel, J.L. Notre Dame, Ind. : University of Notre Dame. *American midland naturalist*. July 1986. v. 116 (1). p. 140-151. ill. Includes references. (NAL Call No.: DNAL 410 M58).

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### **Literature review and approaches to studying the impacts of forest harvesting and residue management practices on forest nutrient cycles.**

MAMRA. Smith, C.T. Jr. Orono, Me. : The Station. Miscellaneous report - University of Maine Agricultural Experiment Station. Literature review. Mar 1985. (305). 34 p. Includes references. (NAL Call No.: DNAL 100 M28M).

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### **Loblolly and shortleaf pine differ in their response when released using herbicide sprays.**

Guldin, R.W. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 287-291. Includes references. (NAL Call No.: DNAL aSD11.U57).

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### **Loblolly seedling genotypic xylem pressure potential responses to cutting practices in the nursery.**

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### **Lodgepole pine ecosystems.**

BISNA. Fahey, T.J. Knight, D.H. Washington, D.C. : The Institute. BioScience - American Institute of Biological Sciences. Oct 1986. v. 36 (9). p. 610-617. ill. Includes references. (NAL Call No.: DNAL 500 AM322A).

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**Lodgepole pine vigor, regeneration, and infestation by mountain pine beetle following partial cutting on the Shoshone National Forest, Wyoming.**

XFIPA. Amman, G.D. Lessard, G.D.; Rasmussen, L.A.; O'Neil, C.G. Ogden, Utah : The Station. Research paper INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Dec 1988. (396). 8 p. Includes references. (NAL Call No.: DNAL A99.9 F764U).

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**Long-term changes from different uses of foothill hardwood rangelands.**

XFGTB. Duncan, D.A. McDougald, N.K.; Westfall, S.E. Berkeley, Calif. : The Station. USDA Forest Service general technical report PSW - United States, Pacific Southwest Forest and Range Experiment Station. Paper presented at the "Symposium on Multiple-Use Management of California's Hardwood Resources," November 12-14, 1986, San Luis Obispo, California. Nov 1987. (100). p. 367-372. ill. Includes references. (NAL Call No.: DNAL aSD11.A325).

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**Long-term effects of a 1932 surface fire on stand structure in a Connecticut mixed hardwood forest.**

XFGTA. Ward, J.S. Stephens, G.R. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 267-273. Includes references. (NAL Call No.: DNAL aSD11.A352).

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**Long-term effects of blue oak removal on forage production, forage quality, soil, and oak regeneration.**

XFGTB. Kay, B.L. Berkeley, Calif. : The Station. USDA Forest Service general technical report PSW - United States, Pacific Southwest Forest and Range Experiment Station. Paper presented at the "Symposium on Multiple-Use Management of California's Hardwood Resources,"

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**Long-term effects of fertilization on stem form, growth relations, and yield estimates of slash pine.**

FOSCA. Jokela, E.J. Harding, R.B.; Nowak, C.A. Bethesda, Md. : Society of American Foresters. The long-term effects of time-of-planting phosphorus (P) fertilization on stem form were evaluated in a 25-year-old slash pine plantation in north Florida. Cylindrical form factor (CFF), relative taper curves, the constant-stress principle of stem formation, and individual tree volume and biomass estimation equations were compared among treatments. Significant differences in CFF and taper existed between control and fertilized trees. Treatment-induced changes in crown size and accelerated tree and stand development may be responsible for these differences. Although statistically significant, alteration of stem form by fertilization was of minor importance relative to the accurate estimation of stand volume and weight. The cost and effort necessary to develop treatment-specific equations for quantifying fertilizer responses for slash pine on P-deficient sites appears unwarranted. Forest science. Sept 1989. v. 35 (3). p. 832-842. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Long-term ozone exposure affects winter hardness of red spruce (*Picea rubens* Sarg.) seedlings.**

NEPHA. Fincher, J. Cumming, J.R.; Alschner, R.G.; Rubin, G.; Weinstein, L. New York, N.Y. : Cambridge University Press. The New phytologist. Sept 1989. v. 113 (1). p. 85-96. ill. Includes references. (NAL Call No.: DNAL 450 N42).

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JEVQAA. Driscoll, C.T. Fuller, R.D.; Simone, D.M. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Jan/Mar 1988. v. 17 (1). p. 101-107. ill., maps. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Longleaf pines used for cavities by red-cockaded woodpeckers.**

JWMAA9. Hooper, R.G. Bethesda, Md. : Wildlife Society. Journal of wildlife management. July 1988. v. 52 (3). p. 392-398. Includes references. (NAL Call No.: DNAL 410 J827).

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AMFOA. Washington, D.C. : American Forestry Association. American forests. Nov 1985. v. 91 (10, i.e. 11). p. 13-16. ill. (NAL Call No.: DNAL 99.8 F762).

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AMFOA. Wright, M.L. Washington, D.C. : American Forestry Association. American forests. Jan/Feb 1987. v. 93 (1/2). p. 30-33, 60-61. ill. (NAL Call No.: DNAL 99.8 F762).

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**Lophodermella species on pines.**

GTRWD. Millar, C.S. Washington, D.C. : The Service. USDA Forest Service general technical report WD. Paper presented at the conference on "Recent Research on Conifer Needle Diseases", October 14-18, 1984, Gulfport, Mississippi. Literature review. Jan 1986. (50). p. 45-55. Includes references. (NAL Call No.: DNAL aSD11.U52).

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**Louisiana "fly-in" evaluates helicopter application of herbicide granules.**

White, L. Washington, D.C. : National Agricultural Aviation Association. Agricultural aviation. July 1985. v. 12 (5). p. 10-11. ill. (NAL Call No.: DNAL S494.5.A3W3).

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**Low-volume applications of azinphosmethyl, fenvalerate, and permethrin for control of coneworms (Lepidoptera:Pyralidae) and seed bugs (Hemiptera:Coreidae and Pentatomidae) in southern pine seed orchards.**

JEENAI. Nord, J.C. DeBarr, G.L.; Barber, L.R.; Weatherby, J.C.; Overgaard, N.A. College Park, Md. : Entomological Society of America. Journal of economic entomology. Apr 1985. v. 78 (2). p. 445-450. ill. Includes references. (NAL Call No.: DNAL 421 J822).

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**Low volume applications of selective industrial herbicides.**

SWSPBE. Hendler, R.J. Burch, P.L.; Kidd, F.A. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 278-287. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Low volume banding techniques for right-of-way management.**

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Cobb, P. Auburn, Ala. : The Station. Research report series - Alabama Agricultural Experiment Station, Auburn University. Aug 1989. (6). p. 10-11. (NAL Call No.: DNAL S541.5.A2R47).

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**Machine application of cut stump treatment herbicides.**

SWSPBE. Vidrine, C.G. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. 1988. v. 41. p. 211-215. ill. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Mathematical analysis and modeling of epidemics of rubber tree root diseases: probability of infection of an individual tree.**

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roles of the various classes of neighbors were established and quantified. Variability between successive inspections was small, and the method of forest clearing was important only while primary inocula in the soil were still infectious. The state of health of the immediate neighbors was most significant; more distant neighbors in the same row had some effect; interrow spread was extremely rare. This investigation dealt only with trees as individuals, and further study of the interrelationships of groups of trees is needed. For. SCI. 34(4):831-845. Forest science. Dec 1988. v. 34 (4). p. 831-845. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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MUCBA. Frazier, R.D. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 22-23. maps. (NAL Call No.: DNAL 275.29 M58B).

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**Modeling for aerial spray buffer zone /prepared by John W. Barry, James E. Rafferty, Robert B. Ekblad.**  
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**Modeling the total evaporation and water balance of a forest canopy.**  
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### **Modeling tree growth potential based on effective evapotranspiration.**

FOSCA. Wickramasinghe, A. Bethesda, Md. : Society of American Foresters. Annual tree growth potential is assessed by modeling effective evapotranspiration and taken as an index expressing interaction between atmospheric energy, potential evapotranspiration (PET), and soil moisture supply. The model has been calibrated for 11 forest stands of two evergreen species, Scots pine (*Pinus Sylvestris*) and Corsican pine (*Pinus Nigra*), located in England. Four calibrated effective evapotranspiration values (EET) together with a simple climatic index (PET/R), which expresses the balance between potential evapotranspiration and rainfall, were subsequently multiplied by tree age to incorporate the physiological efficiency of trees. The derived potential growth indexes (PGIs) were comparatively examined with actual annual tree growth data for a period of 30 to 40 years. Regression analysis was carried out in evaluating the model performance and the applicability of the model to predict environmental potential. All four predictions based on assessment of effective evapotranspiration were positively correlated with annual tree growth, having coefficients of determination above 0.40, and often reaching 0.70, with significance at the 0.001 level of probability. *FOR. SCI.* 34(4):864-881. *Forest science*. Dec 1988. v. 34 (4). p. 864-881. ill. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Modelling the distribution of leaves, oakworms and damaged foliage for the coast live oak.**

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XGNEA. Stedinger, J.R. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 159-164. ill. Includes references. (NAL Call No.: DNAL aSD11.U56).

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Waters, W.E. New York : Wiley, c1985. Integrated pest management in pine-bark beetle ecosystems / edited by William E. Waters, Ronald W. Stark, David L. Wood. p. 141-175. (NAL Call No.: DNAL SB608.P65I58).

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### **Monitoring cold hardiness of tree seedlings by infrared thermography.**

Laacke, R.J. Weatherspoon, C.P.; Tinus, R.W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 97-102. Includes references. (NAL Call No.: DNAL aSD11.A42).

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### **Monitoring damage by yellowheaded spruce sawflies with sawfly and parasitoid pheromones.**

EVETEX. Morse, B.W. Kulman, H.M. College Park, Md. : Entomological Society of America. *Environmental entomology*. Apr 1985. v. 14 (2). p. 131-133. Includes references. (NAL Call No.: DNAL QL461.E532).

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### **Monitoring environmental impacts on forest ecosystems using spruce needles--investigations on representative sample collection programs.**

Peters, J. Maurer, W. Deerfield Beach, Fla. : VCH Publishers, c1985. Air pollution and plants / edited by Clement Trojanowsky. Presented at the 2nd "European Conference on Chemistry and the Environment," May 21-24, 1984, Lindau, West Germany. p. 217. (NAL Call No.: DNAL QK751.E97 1984).

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Dymock, I.J. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a meeting of the Western Forest Nursery Associations, Aug 8-11, 1988, Vernon, British Columbia. Dec 1988. (167). p. 96-105. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Monoterpene metabolism in female mountain pine beetles, *Dendroctonus ponderosae* Hopkins, attacking ponderosa pine.**

JCECD. Pierce, H.D. Jr. Conn, J.E.; Dehlschlager, A.C.; Borden, J.H. New York, N.Y. : Plenum Press. Journal of chemical ecology. June 1987. v. 13 (6). p. 1455-1480. Includes references. (NAL Call No.: DNAL QD415.A1U6).

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**Montcalm: summary of gypsy moth impacts, management activities, and plans.**

MUCBA. Smucker, D.R. O'Donnell, J. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 24-25. maps. (NAL Call No.: DNAL 275.29 M58B).

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**Morphological changes accompanying the transition from juvenile (atmospheric) to adult (tank) forms in the Mexican epiphyte *tillandsia deppeana* (Bromeliaceae).**

AUBOA. Adams, W.W. III. Martin, C.E. Baltimore, Md. : Botanical Society of America. American journal of botany. Aug 1986. v. 73 (8). p. 1207-1214. ill. Includes references. (NAL Call No.: DNAL 450 AM36).

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Cripe, R.E. Ecino, Calif : Gold Trade Publications. Arbor age. July 1987. v. 7 (7). p. 12-14, 16. ill. (NAL Call No.: DNAL SB435.5.A645).

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**Mortality of bareroot Colorado blue spruce seedlings, Montana State Nursery, Missoula /R.L. James.**

James, R. L. Missoula, Mont. : U.S. Dept. of Agriculture, Forest Service, Northern Region, 1987. Caption title.~ "December 1987."~ At head of title: Forest Pest Management. 6 p. ; 28 cm. Bibliography: p. 5-6. (NAL Call No.: DNAL aSD11.U585 no.87-12).

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**Mortality of elm leaf beetle (Coleoptera: Chrysomelidae) larvae exposed to insecticide bands applied to elm bark.**

JEENAI. Hall, R.W. Nielsen, D.G.; Young, C.E.; Hamerski, M.R. College Park, Md. : Entomological Society of America. Abstract: Third instar elm leaf beetles, *Xanthogaleruca luteola* (Muller), were placed above insecticide bark bands on trunks of Siberian and 'Urban' elms and allowed to migrate across the bands. Carbaryl and bendiocarb applied at 0.5, 1 and 2%, and 0.2% esfenvalerate were effective on the day of application. Treatments of 1 and 2% carbaryl, 1 and 2% bendiocarb, and 0.2% esfenvalerate caused significant larval mortality 2 wk after application. The 0.2% esfenvalerate treatment was effective up to 8 wk after a late June application. With fluvalinate, only the 0.4% rate caused an acceptable level of larval mortality. A treatment of 2% phosmet was ineffective. Journal of economic entomology. June 1988. v. 81 (3). p. 877-879. Includes references. (NAL Call No.: DNAL 421 J822).

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**Motorcycle thermal fog generator used in ant control.**

Marcio da Cruz, J. Nogueira, S.B.; Mantovani, A. St. Joseph, Mich. : The Society. American Society of Agricultural Engineers (Microfiche collection). Paper presented at the 1985 Winter Meeting of the American Society of Agricultural Engineers. Available for purchase from: The American Society of Agricultural Engineers, Order Dept., 2950 Niles Road, St. Joseph, Michigan 49085. Telephone the Order Dept. at (616) 429-0300 for information and prices. 1985. (fiche no. 85-1506). 11 p. ill. Includes references. (NAL Call No.: DNAL FICHE S-72).

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**Mountain beaver: the rodent that gets no respect.**

AMFOA. Smurthwaite, D. Washington, D.C. : American Forestry Association. American forests. May 1986. v. 92 (5). p. 46-50. ill. (NAL Call No.: DNAL 99.8 F762).



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### **Mountain pine beetle.**

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**Parasites reared from *Misogada unicolor* (Packard) (Lepidoptera: Notodontidae), a defoliator of sycamore trees.**

JKESA. Thompson, L.C. Solomon, J.D. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. July 1986. v. 59 (3). p. 563-566. Includes references. (NAL Call No.: DNAL 420 K13).

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JKESA. Thompson, L.C. Solomon, J.D. Lawrence, Kan. : The Society. Journal of the Kansas Entomological Society. Oct 1986. v. 59 (4). p. 745-749. Includes references. (NAL Call No.: DNAL 420 K13).

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**Partial inhibition of pheromone production in *Dendroctonus ponderosae* (Coleoptera: Scolytidae) by polysubstrate monooxygenase inhibitors.**

JCECD. Hunt, D.W.A. Smirle, M.J. New York, N.Y. : Plenum Press. Journal of chemical ecology. Feb 1988. v. 14 (2). p. 529-536. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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**Pathogenicity of the pine wood nematode /edited by Michael J. Wingfield.**

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### **The pathways of chemotherapeutants in the control of tree diseases.**

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### **Pathways of nucleopolyhedrosis virus infection in the gypsy moth, *Lymantria dispar*.**

XGNEA. Shields, K.S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 123-124. Includes references. (NAL Call No.: DNAL aSD11.U56).

4659

### **Patterns of leader elongation in loblolly pine families.**

FOSCA. Bridgwater, F.E. Williams, C.G.; Campbell, R.G. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1985. v. 31 (4). p. 933-944. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4660

### **Patterns of leaf area distribution within crowns of nitrogen- and phosphorus-fertilized loblolly pine trees.**

FOSCA. Vose, J.M. Bethesda, Md. : Society of American Foresters. Field trials of nitrogen (N) and phosphorus (P) fertilization in loblolly pine plantations (*Pinus taeda* L.) were used to determine the effects of fertilization on within-crown leaf area distribution in a fully stocked stand, and two less than fully stocked stands. A second objective was to examine the utility of the Weibull distribution for modeling leaf area distribution in loblolly pine crowns. Results showed that leaf area increases were most evident in the mid- and lower-crown positions (2-4 m and 4-6 m crown depths), regardless of stocking level. Response patterns suggested that the Westvaco Stocking Chart, which is based on empirical relationships between stand basal area, stand density, and canopy closure, did not adequately reflect light interception in these stands because stands were ranked differently when stocking was expressed by stand leaf area index. The fully stocked stand was 50% below the theoretical optimum leaf area index value of 5. Thus, it is hypothesized that leaf area increases occurred in the mid- and lower-crown positions because shading in the mid- and lower-crown positions was insufficient to inhibit foliage production and survival. Fertilization-induced

changes in leaf physiology may have also played an important role in leaf production and branch retention in the mid- and lower-crown. The Weibull distribution provided a good fit of within-crown leaf area distribution. For. Sci. 34(3): 564-573. Forest science. Sept 1988. p. 564-573. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Brownlee, E. Beltsville, Md. : The Library. Quick bibliography series - National Agricultural Library (U.S.). Bibliography. Dec 1987. (88-11). 17 p. (NAL Call No.: DNAL aZ5071.N3).

4662

### **Pennsylvania's experiences with microbial control of the gypsy moth.**

XGNEA. Nichols, J.D. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 29-30. (NAL Call No.: DNAL aSD11.U56).

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### **Penumbra effects on sunlight penetration in plant communities.**

ECOLA. Smith, W.K. Knapp, A.K.; Reines, W.A. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. Dec 1989. v. 70 (6). p. 1603-1609. ill. Includes references. (NAL Call No.: DNAL 410 EC7).

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Mason, G.N. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. Meeting held Oct 16-19, 1988, Rochester, New York. 1989. p. 15-20. Includes references. (NAL Call No.: DNAL SD143.S64).

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### **Performance of Livingston Parish loblolly pine in the Georgia Piedmont.**

SJAFD. Powers, H.R. Jr. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. May 1986. v. 10 (2). p. 84-87. ill., maps. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Performance of *Miconia albicans* (Sw.) triana, an aluminum-accumulating species, in acidic and calcareous soils.**

CSOSA2. Haridasan, M. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May/Sept 1988. v. 19 (7/12). p. 1091-1103. Includes references. (NAL Call No.: DNAL S590.C63).

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**Performance of range-wide provenances of northern white-cedar in three central Illinois plantations over a 20-year period.**

Jokela, J.J. Savka, M.A. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 107-111. Includes references. (NAL Call No.: DNAL SD399.5.N6).

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**Periodical cicada in Indiana.**

Schuder, D.L. West Lafayette : The Service. Publication E - Purdue University, Cooperative Extension Service. In subseries: Ornamentals Insects. Jan 1987. (47,rev.). 2 p. (NAL Call No.: DNAL SB844.I6P8).

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**Persistence characteristics of operationally sprayed fenitrothion in nearby unsprayed areas of a conifer forest ecosystem in New Brunswick.**

JPFCD2. Sundaram, K.M.S. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1987. v. B22 (4). p. 413-438. Includes references. (NAL Call No.: DNAL TD172.J61).

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**Persistence, degradation, and movement of triclopyr and its ethylene glycol butyl ether ester in a forest soil.**

JAFCAU. Lee, C.H. Oloffs, P.C.; Szeto, S.Y. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Nov/Dec 1986. v. 34 (6). p. 1075-1079. Includes references. (NAL Call No.: DNAL 381 J8223).

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**Persistence, mobility and degradation of hexazinone in forest silt loam soils.**

JPFCD2. Feng, J.C. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1987. v. 22 (2). p. 221-233. Includes references. (NAL Call No.: DNAL TD172.J61).

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**Persistence, movement, and degradation of glyphosate in selected Canadian boreal forest soils.**

JAFCAU. Roy, D.N. Konar, S.K.; Banerjee, S.; Charles, D.A.; Thompson, D.G.; Prasad, R. Washington, D.C. : American Chemical Society. Journal of agricultural and food chemistry. Mar/Apr 1989. 37 (2). p. 437-440. Includes references. (NAL Call No.: DNAL 381 J8223).

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**Persistence of *Bacillus thuringiensis* in two formulations applied by helicopter against the western spruce budworm (Lepidoptera: Tortricidae) in north central Oregon.**

JEENAI. Beckwith, R.C. Stelzer, M.J. College Park, Md. : Entomological Society of America. Journal of economic entomology. Feb 1987. v. 80 (1). p. 204-207. Includes references. (NAL Call No.: DNAL 421 J822).

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**Pest assessments after sanitation-salvage cutting in fusiform rust-infected slash pine plantations.**

Miller, T. Belanger, R.P.; Webb, R.S.; Godbee, J.F. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 258-262. Includes references. (NAL Call No.: DNAL aSD11.U57).

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Hill, D.B. Lexington, Ky. : The Service. FOR - Kentucky University, Cooperative Extension Service. In subseries: Kentucky Christmas Tree Production Workbook. Apr 1986. (27). 3 p. ill. (NAL Call No.: DNAL SD436.K4A2).



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### **Pest management in the urban forest.**

CAGRA. Dahlsten, D.L. Hajek, A.E.; Clair, D.J.; Dreistadt, S.H.; Rowney, D.L.; Lewis, V.R. Berkeley : The Station. California agriculture - California Agricultural Experiment Station. Jan/Feb 1985. v. 39 (1/2). p. 21-23. ill. (NAL Call No.: DNAL 100 C12CAG).

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### **The pest management information center: a three part computerized delivery system.**

Ham, D.L. Marshall, M.S.; Karpinski, C. Florence, Ala. : The Institute, c1985. Software solutions : proceedings: symposium, software fair and 2nd Annual Meeting of Forest Resources System Institute, April 21-24, 1985, Clarksville, Indiana / edited by J.G. Massey, B.J. Greber, T.M. p. 89-91. Includes references. (NAL Call No.: DNAL SD381.5.S62).

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### **Pest management principles for the commercial applicator forest pest control /Gayle Worf ... et al. .**

Worf, Gayle L. Madison : University of Wisconsin-Extension, 1988. Abstract: Training manual for commercial pesticide applicators in the forest crop pest-control category. Major topics: application of pest management principles for weed, insect, and disease control; toxicity of pesticides; protecting human health and the environment; disposal; equipment calibration; IPM practices; and label information. "Forest crop pest control"--Cover.~ January 1988. viii, 218 p. : ill. ; 28 cm. Bibliography: p. 185. (NAL Call No.: DNAL SB763.W5P47 1988).

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### **Pest management principles for the commercial applicator forestry pest control study guide /Gayle Worf ... et al. .**

Worf, Gayle L. Madison : University of Wisconsin-Extension, 1988. Abstract: This study guide accompanies Pest Management Principles for the Commercial Applicator: Forest Pest Control. It contains multiple choice questions and answers on a variety of subjects including laws and regulations, formulations, safety, application principles, and resistance to pesticides. Cover title.~ January 1988. 34 p. ; 28 cm. (NAL Call No.: DNAL SB763.W5P472 1988).

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**Pesticide background statements**Volume IV **Insecticides /Leo Boberschmidt ... et al. .** Boberschmidt, Leo. Washington, D.C. : Forest Service, U.S. Dept. of Agriculture, 1989. "July 1989."~ "Prepared for the U.S. Department of Agriculture, Forest Service, Forest Pest

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### **Pesticide drift: toxicological and social consequences.**

ACSMC. Witt, J.M. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. 1985. (273). p. 493-508. Includes 6 references. (NAL Call No.: DNAL QD1.A45).

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### **Pesticide risk acceptability: science or politics.**

Green, K. S.I. : s.n. . Proceedings ... annual Forest Vegetation Management Conference. Meeting held November 1-2, 1984, Redding, California. Aug 1985. (6th). p. 1-11. Includes references. (NAL Call No.: DNAL QH541.5.F6F67).

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### **Pesticides have little impact on attraction of three species of male moths to sex pheromone.**

JEENAI. Sower, L.L. Shorb, M.D. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1985. v. 78 (4). p. 908-912. ill. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Pesticides issues: public ignorance is not bliss.**

Witt, T.L. Van Nuys, Calif. : Gold Trade Publications. Arbor age. June 1989. v. 9 (6). p. 16-18. (NAL Call No.: DNAL SB435.5.A645).

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### **Pesticides issues: public ignorance is not bliss.**

JOARD. Witt, T.L. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Mar 1988. v. 14 (3). p. 57-60. (NAL Call No.: DNAL SB436.J6).

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### **Pests not known to occur in the United States or of limited distribution. 65.**

Whitehead, D.R. Anderson, D.M.; Whittle, K. Hyattsville, Md. : The Service. APHIS 81 - U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Sept 1985. (46). p. 61-73. ill., maps. Includes references. (NAL Call No.: DNAL aSB599.A3U5).

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**Pests not known to occur in the United States or of limited distribution. 66.**

Whittle, K. Anderson, D.M. Hyattsville, Md. : The Service. APHIS 81 - U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Sept 1985. (46). p. 75-87. ill., maps. Includes references. (NAL Call No.: DNAL ASB599.A3U5).

4689

**Pests not known to occur in the United States or of limited distribution. 81. European spruce beetle.**

Whittle, K. Anderson, D.M. Hyattsville, Md. : The Service. APHIS 81 - U.S. Department of Agriculture, Animal and Plant Health Inspection Service. Sept 1987. (50). 12 p. ill., maps. Includes references. (NAL Call No.: DNAL ASB599.A3U5).

4690

**Phenological and morphological responses of mesic and dry site sources of coastal Douglas-fir to water deficit.**

FOSCA. Joly, R.J. Adams, W.T.; Stafford, S.G. Bethesda, Md. : Society of American Foresters. Patterns of genetic variation in morphological and phenological responses to water deficit are described in seedling progeny of four populations of coastal Douglas-fir (*Pseudotsuga menziesii* Mirb. Franco var. *menziesii*), sampled from coastal and inland sites in Oregon. Progeny of coastal and inland populations differed for all traits measured, and differences appear to reflect adaptation to the source environment. Inland populations were characterized by early budset, slower rates of shoot extension, and higher root-shoot ratios. A significant fraction of total variability was attributable to differences among families within populations. Little evidence for irrigation x population interaction was found when seedling traits were examined singly. Of 16 traits analyzed, only average daily rate of growth and seedling height had significant interaction terms. Interactions between irrigation and families-within-population were more prevalent. A canonical discriminant analysis was used to identify a subset of variables that best reveals differences among progeny of coastal and inland populations. Implications for seed transfer and for selection and breeding of genotypes suitable for xeric environments are discussed. Forest science. Dec 1989. v. 35 (4). p. 987-1005. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4691

**Phenology and degree-day relationships of the obscure scale (Homoptera: Diaspididae) and associated parasites on pin oak in Kentucky.** JEENAI. Potter, D.A. Jensen, M.P.; Gordon, F.C. Lanham, Md. : Entomological Society of America. Seasonal phenology of the obscure scale, *Melanaspis obscura* (Comstock), was monitored for 4 yr on *Quercus palustris* M. in Lexington, Ky., and emergence of adult males and crawlers was related to physiological time (i.e., degree-days DD). This scale is univoltine in Kentucky and both sexes overwinter as second instars. Date of first hatch of crawlers during 1984-1986 ranged from 22 June to 6 July, corresponding to a mean accumulation of 1,521 DDC (2,737 DDF) calculated from a base of 4.44 degrees C (40 degrees F). This value accurately predicted crawler hatch dates in West Lafayette, Ind., and College Park, Md., in 1986, and in Lexington in 1987. Six species of primary parasites and one hyperparasite species were reared from scale-infested twig samples. Parasite flight periods were determined from sticky trap collections within tree crowns. Application of insecticidal sprays during July for control of obscure scale crawlers would unfortunately coincide with peak activity of the scale's primary parasites. Journal of economic entomology. Apr 1989. v. 82 (2). p. 551-555. Includes references. (NAL Call No.: DNAL 421 J822).

4692

**Phenology and heat accumulation as field guides for the seasonal history of the western pine shoot borer (Lepidoptera: Olethreutidae).**

JEENAI. Mitchell, R.G. Sower, L.L. Lanham, Md. : Entomological Society of America. Survey and control measures are available for the western pine shoot borer, *Eucosma sonomana* Kearfott, but timing is a problem because of the cryptic nature of the insect in the field. In central Oregon, key features of the insect's seasonal history were related to heat accumulation (degree-days DD above 5.5 degrees C) and phenological characteristics of one of its hosts, ponderosa pine, *Pinus ponderosa* Douglas ex Laws., and eight other associated shrubs and forbs. These relationships permit the status of the shoot borer's seasonal history, such as the egg-laying period, to be established indirectly from local temperature records or by observations of some obvious phenological characteristics of its host and associated plants. Journal of economic entomology. Feb 1988. v. 81 (1). p. 286-289. Includes references. (NAL Call No.: DNAL 421 J822).

4693

**Pheromone-dependent species recognition mechanisms between *Neodiprion pinetum* and *Diprion similis* on white pine.**

JCECD. Olaf, J.I. Matsumura, F.; Kikukawa, T.; Coppel, H.C. New York, N.Y. : Plenum Press. Journal of chemical ecology. Apr 1988. v. 14 (4). p. 1131-1144. Includes references. (NAL



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Call No.: DNAL QD415.A1J6).

4694

**Pheromone lures to monitor sparse populations of spruce budworm, *Choristoneura fumiferana* (Lepidoptera: Tortricidae).**

GRLEA. Grimbale, D.G. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Winter 1988. v. 21 (4). p. 141-145. Includes references. (NAL Call No.: DNAL QL461.M5).

4695

**Pheromone mating disruption of *Rhyacionia zozana* (Lepidoptera: Tortricidae): influence on the associated parasite complex.**

EVETEX. Niwa, C.G. Daterman, G.E. Lanham, Md. : Entomological Society of America. Larval and pupal parasites were collected before and after a mating disruption test of *Rhyacionia zozana* (Kearfott) to determine if the pheromone treatment affected either the species distribution or abundance of the parasite complex. Total percentage of parasitism was not changed because of the disruption treatment. In treated areas, however, abundance of the most numerous moth parasite, *Glypta zozanae* Walley and Barron, was reduced significantly below check plantation levels. In contrast, abundance of the pupal parasite *Mastrus aciculatus* (Provancher) was higher in pheromone-disrupted areas. No changes in the sex ratios of these species were attributable to the pheromone treatment. Parasite community structures were compared using a similarity index. The degree of likeness between treated and checked plantations decreased after disruption, probably because of the changes in the incidence of parasitism by *G. zozanae* and *M. aciculatus*. Accounting for parasitism and reduced mating, surviving host populations in check plantations were over four times greater than in pheromone-disrupted areas. The importance of the host's sex pheromone as a potential kairomone and effects of changes in the host density caused by the mating disruption treatment on the associated parasite complex are discussed. Environmental entomology. Aug 1989. v. 18 (4). p. 570-574. Includes references. (NAL Call No.: DNAL QL461.E532).

4696

**Phoma blight of fir and douglas-fir seedlings in a California nursery.**

PLDRA. Kliejunas, J.T. Allison, J.R.; McCain, A.H.; Smith, R.S. Jr. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1985. v. 69 (9). p. 773-775. ill. Includes 13 references. (NAL Call No.: DNAL 1.9 P69P).

4697

**Phomopsis shoot blight of Colorado blue spruce.** Sanderson, P.G. Worf, G.L. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Dec 1986. v. 4 (4). p. 134-138. ill. Includes 15 references. (NAL Call No.: DNAL SB1.J66).

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**Phosphatase and nitrate reductase activities of *Pisolithus tinctorius*: intraspecific variation and ecological inferences.**

Ho, I. Trappe, J.M. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 353. Includes references. (NAL Call No.: DNAL aQK6O4.N6 1984).

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**A photographic system for measuring shoot elongation in tree seedlings and relation to solar radiation and temperature.**

GROWA. Kanninen, M. Pohja, T.; Siivola, E. Lakeland, Fla. : Growth Publishing. Growth. Spring 1985. v. 49 (1). p. 44-50. ill. Includes references. (NAL Call No.: DNAL 442.8 G91).

4700

**A photographic technique for estimating browse growth and use.**

WLSBA. Krebs, C.J. Sinclair, A.R.E.; Boonstra, R.; Smith, J.N.M. Bethesda, Md. : The Society. Wildlife Society bulletin. Fall 1986. v. 14 (3). p. 286-288. ill. Includes references. (NAL Call No.: DNAL SK357.A1W5).

4701

**Photosynthesis, water relations, and drought adaptation in six woody species of oak-hickory forests in central Missouri.**

FOSCA. Bahari, Z.A. Pallardy, S.G.; Parker, W.C. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 557-569. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4702

**Photosynthetic life span of attached poplar leaves under favorable controlled environmental conditions**

FOSCA. Nelson, N.D. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 700-705. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4703

**Physical aspects of freezing in black oak acorns.**

Boese, S.R. George, M.F.; Mitchell, R.J.; Martin, U.; McQuilkin, R.A. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 222-227. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

4704

**Physiological and morphological responses of three half-sib families of loblolly pine to water-stress conditioning.**

FOSCA, Seiler, J.R. Johnson, J.D. Bethesda, Md. : Society of American Foresters. Abstract: The effect of water-stress conditioning on drought tolerance of three open-pollinated families of loblolly pine (*Pinus taeda* L.) during water stress was investigated. Seedlings were subjected to one of two levels of prolonged, sublethal drought or were kept well watered. After the conditioning period, photosynthesis, transpiration, and growth were evaluated. Photosynthesis was decreased greatly with reduced needle water potential. Conditioned seedlings generally maintained positive net photosynthesis to water potentials 0.15 (moderate water-stress conditioning) and 0.40 (severe water-stress conditioning) MPa lower than those of control seedlings. This response was likely the result of an acclimation of the photosynthetic process resulting in less nonstomatal inhibition of photosynthesis at low needle water potentials. Under well-watered conditions, transpiration, but not photosynthesis, was reduced greatly by the conditioning treatments and resulted in improved water-use efficiency. Root growth was affected more by water stress than shoot growth, causing a decrease in root/shoot ratio. Genetic differences in photosynthetic acclimation were not apparent. However, compared to seedlings representing two Virginia seed sources, a family from Texas, known for its superior drought tolerance, had the lowest root/shoot ratio and the least change in transpiration in response to water-stress conditioning. FOR. SCI. 34(2):487-495. Forest science. June 1988. v. 34 (2). p. 487-495. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4705

**Physiological characteristics of loblolly pine seedlings in relation to field performance.**

Kramer, P.J. Rose, R.W. Jr. Auburn, Ala. : Orders, Dept. of Research Information, Auburn University, 1986? . Proceedings of the International Symposium on Nursery Management Practices for the Southern Pines, Montgomery, Alabama, August 4-9, 1985 / edited by David B. South. p. 416-440. Includes references. (NAL

Call No.: DNAL SD397.P55I58 1985).

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**Physiological responses of deciduous tree root collar drenched with flurprimidol.**

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JEENAI. Sower, L.L. Overhiser, D.L. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1986. v. 79 (6). p. 1645-1647. Includes references. (NAL Call No.: DNAL 421 J822).

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**Recovery of pine beauty moth (*Panolis flammea*) nuclear polyhedrosis virus from pine foliage.**

JIVPA. Carruthers, W.R. Cory, J.S. ; Entwistle, P.F. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. July 1988. v. 52 (1). p. 27-32. Includes references. (NAL Call No.: DNAL 421 J826).

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**Red spruce rhizosphere dynamics: spatial distribution of aluminum and zinc in the near-root soil zone.**

FOSCA. Smith, W.H. Pooley, A.S. Bethesda, Md. : Society of American Foresters. Red spruce roots, associated with mature, healthy trees occupying canopy positions, were located in three 8.5 m<sup>2</sup> forest floor plots at 250 m elevation in the Hubbard Brook Experimental Forest, White Mountain National Forest, New Hampshire. Roots, 0.25-1.0 cm diam, were severed, and cut ends were placed in soil in plastic bags. In 14 months, new roots developed behind cut ends and were cultured in wooden trays containing screened forest floor material. Forest floor concentrations of aluminum, calcium, chlorine, iron, lead, and zinc were established. Trays containing roots were supplied with a distilled water treatment or with distilled water containing chloride salts of aluminum, lead or zinc sufficient to increase substrate cation concentration by 500 ppm. Eight weeks following treatment, roots (largely ectomycorrhizal, diam 0.4-1.0 mm) with associated rhizosphere soil were harvested by impregnating specimens in agar and freezing in liquid nitrogen. Cross sections of root-rhizosphere soil samples were freeze dried and examined with a scanning electron microscope and energy dispersive x-ray spectrometer. Gradients of element concentrations were established along transects from root interiors (cortex) through the inner and outer rhizosphere zones (2 mm from root) and in bulk soil (devoid of roots). The pH of rhizosphere soil was approximately 0.5 unit less than bulk soil. Aluminum concentrations exhibited a strongly descending gradient from bulk soil through the rhizosphere to the root. Estimated concentrations ranged from 1000 ppm within 200 microns of the root to 10 x this amount in soil beyond 2000 microns. Calcium distribution, without aluminum amendment, was relatively constant through the rhizosphere, but with aluminum amendment, calcium exhibited a sharply decreasing gradient near the root. In the unamended treatment, the Al:Ca ratio dropped from 7 to 0.2 across the rhizosphere. Chlorine was constant in the rhizosphere but exhibited pronounced accumulation in. Forest science. Dec 1989. v. 35 (4). p. 1114-1124. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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Conkey, L.E. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 382-391. Includes references. (NAL Call No.: DNAL QK477.2.A615 1986).

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XAAHA. Berry, F.H. Washington, D.C. : The Department. Agriculture handbook - United States Department of Agriculture. Dec 1985. (595, slightly rev.). 24 p. ill. Includes references. (NAL Call No.: DNAL 1 AG84AH).

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Russell, K.W. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 131-134. ill. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Reduction of Phellinus weirii inoculum in Douglas-fir stumps by the fumigants chloropicrin, Vorlex, or methylisothiocyanate.**

FOSCA. Thies, W.G. Nelson, E.E. Bethesda, Md. : Society of American Foresters. Forest science. June 1987. v. 33 (2). p. 316-329. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Reduction of ponderosa pine dwarf mistletoe with the plant growth regulator ethephon.**

Johnson, D.W. Hawksworth, F.G. Denver, Colo. : The Service. Technical report R2 - U.S. Department of Agriculture, Forest Service, Forest Pest Management. Mar 1988. (42). 10 p. ill. Includes references. (NAL Call No.: DNAL aSD11.A422).

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**Reduction of survival and growth of young Pinus jeffreyi by an herbaceous perennial, Wyethia mollis.**

AMNAA. Parker, V.T. Yoder-Williams, M.P. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1989. v. 121 (1). p. 105-111. Includes references. (NAL Call No.: )



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FOSCA. Witter, J.A. Ragenovich, I.R. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1986. v. 32 (3). p. 585-594. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Regeneration of shoots from leaf disk explants of black locust, Robinia pseudoacacia L.**

Davis, J.M. Keathley, D.E. Madison : Dept. of Forestry, University of Wisconsin-Madison. Proceedings of the ... North Central Tree Improvement Conference. 1985? . (4th). p. 29-34. Includes references. (NAL Call No.: DNAL SD399.5.N6).

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**Reinvestigation confirms action of delta 11-desaturases in spruce budworm moth sex pheromone biosynthesis.**

JCECD. Wolf, W.A. Roelofs, W.L. New York, N.Y. : Plenum Press. Journal of chemical ecology. May 1987. v. 13 (5). p. 1019-1027. Includes references. (NAL Call No.: DNAL QD415.A1J6).

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**Relation between cold hardiness, root growth capacity, and bud dormancy in three western conifers.**

Tinus, R.W. Burr, K.E.; Wallner, S.J.; King, R.M. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, U.S. Department of Agriculture, Forest Service. Paper presented at a Meeting of the Combined Western Forest Nursery Council and Intermountain Nursery Association, August 12-15, 1986, Tumwater, Washington. Dec 1986. (137). p. 80-86. Includes references. (NAL Call No.: DNAL aSD11.A42).

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**Relationship between color intensity of leaf supernatants from resistant and susceptible birch trees and rate of oviposition by the birch leafminer (Hymenoptera: Tenthredinidae).**

JEENAI. Fiori, B.J. Graig, D.W. Lanham, Md. : Entomological Society of America. In no-choice laboratory tests, young leaves from trees of *Betula davurica* Pall. Fl. Ross., *Betula maximowicziana* Reg., *Betula schmidtii* Reg., and *Betula costata* Trautv. exhibited 95-100% reductions in oviposition by the birch leafminer *Fenusa pusilla* (Lepeletier) compared with leaves from *Betula populifolia* Marsh. Visible absorbance ratios (500 nm: 400 nm) of aqueous supernatants from leaves which exhibited high reductions in oviposition were 2.5- to 4-fold greater than ratios from leaves of *B. populifolia*. Results suggest these trees offer high resistance against birch leafminer damage and that absorbance characteristics of supernatants from young leaves can be used to detect high levels of resistance. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1331-1333. Includes references. (NAL Call No.: DNAL 421 J822).

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**Relationship between initial seedling height and survival and growth of loblolly pine seedlings planted during a droughty year.**

SJAFD. Tuttle, C.L. South, D.B.; Golden, M.S.; Meldahl, R.S. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1987. v. 11 (3). p. 139-143. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Relationship between outbreaks of saddled prominent, *Heterocampa guttivitta* (Lepidoptera: Notodontidae), and drought.**

EVETEX. Martinat, P.J. Allen, D.C. College Park, Md. : Entomological Society of America. Environmental entomology. Feb 1987. v. 16 (1). p. 246-249. Includes references. (NAL Call No.: DNAL QL461.E532).

4839

**Relationship between susceptibility of gypsy moth larvae (Lepidoptera: Lymantriidae) to a Baculovirus and host plant foliage constituents.**

EVETEX. Keating, S.T. Yendol, W.G.; Schultz, J.C. Lanham, Md. : Entomological Society of America. The susceptibility of gypsy moth, *Lymantria dispar* L., larvae to the gypsy moth nuclear polyhedrosis virus was significantly altered when larvae were fed different host plants in conjunction with the virus. Larvae consuming the virus on the foliage of oak species suffered lower mortality rates than did larvae consuming the virus-contaminated foliage of aspen species. Decreased viral pathogenicity

was correlated with increased acidity and hydrolyzable tannin content of the leaf material. Environmental entomology. Dec 1988. v. 17 (6). p. 952-958. Includes references. (NAL Call No.: DNAL QL461.E532).

4840

**The relationship between tree diameter growth and climate in the Lake States.**

XFGTA. Holdaway, M.R. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the "Conference on Forest Growth Modelling and Prediction," Aug 23-27, 1987, Minneapolis, Minnesota. 1988. (120). p. 490-497. Includes references. (NAL Call No.: DNAL aSD11.A352).

4841

**Relationship between volume and biomass of early successional vegetation and the prediction of loblolly pine seedling growth.**

FDSCA. Byrne, S.V. Wentworth, T.R. Bethesda, Md. : Society of American Foresters. A simple and nondestructive method of measuring plant volume was developed to test the following two hypotheses: (1) plant volume is an effective substitute for plant biomass in the prediction of competitive potential; and (2) the plant biomass-volume relationship is affected by plant growth form. In 1983, above-ground volume and biomass were determined for all plants in 40 1-m<sup>2</sup> plots in an experimental loblolly pine (*Pinus taeda* L.) plantation having varying degrees of successional regrowth. After natural log transformations of plant biomass and volume, separate regression equations were developed for grass, forb, shrub, and tree growth forms. A test of homogeneity indicated that the slopes and intercepts for the four regression equations were not all identical. Specific contrasts among the regression equations were also tested for common slopes and intercepts to determine the source of overall significance. Results of the contrasts were explained by differences in plant allocation patterns. The variation in plant biomass accounted for by the volume models ranged from 78% for grasses to 94% for trees. As an application of this approach, volume was measured and biomass was estimated from the regression equations for successional plants within a 2m radius (the "neighborhood") of each of 69 loblolly pine seedlings. Total plant volume and total estimated biomass each accounted for approximately 40% of the variation in pine growth. FOR. SCI. 34(4):939-947. Forest science. Dec 1988. v. 34 (4). p. 939-947. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4842

**The relationship between western spruce budworm defoliation levels and growth of individual Douglas-fir and grand fir trees.**

FDSCA. Nichols, T.J. Bethesda, Md. : Society of American Foresters. Abstract: Regression models were fit relating foliage levels to height and basal area growth of 192 trees from 26 stands representing a wide range of site and stand conditions. The study confirmed that deteriorated tree conditions in prior years (often resulting from defoliation) affect current-year growth at specific foliage levels. Absolute height and basal area growth at specific foliage levels were found to be linearly related to absolute height and basal area growth before defoliation, indicating that proportional growth losses resulting from specified levels of defoliation do not vary between fast-growing and slow-growing trees. Various site, stand, and tree variables showed no effect on the relationship between foliage levels and proportional growth loss. Models that included predicted nondefoliated growth, foliage level, and preceding-year condition variables explained up to 61 and 91% of the variation in height and basal area growth (In-In transformation), respectively. FOR. SCI. 34(2):496-504. Forest science. June 1988. v. 34 (2). p. 496-504. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4843

**Relationship of aspect to soil nutrients, species importance and biomass in a forested watershed in West Virginia.**

Hicks, R.R. Jr. Frank, P.S. Jr. Asheville : The Council. Proceedings - Annual Hardwood Symposium of the Harwood Research Council. Paper presented at the "Symposium on The Changing Hardwood Scene," May 22-24, 1985, High Point, North Carolina. 1985. (13th). p. 50-60. Includes references. (NAL Call No.: DNAL SD397.H3H37).

4844

**Relationship of feeding damage by red squirrels to cultural treatments in young stands of lodgepole pine.**

XGTIA. Brockley, R.P. Sullivan, T.P. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 322-329. Includes references. (NAL Call No.: DNAL aSD11.A48).



## (FORESTRY RELATED)

4845

### **Relationship of growth reduction in Douglas-fir to infection by Armillaria root disease in southeastern British Columbia.**

PHYTA. Bloomberg, W.J. Morrison, D.J. St. Paul, Minn. : American Phytopathological Society. Stem volume growth during consecutive 5-yr periods was measured in four Douglas-fir (*Pseudotsuga menziesii*) stands infected by *Armillaria ostoyae* in the interior cedar-hemlock and montane spruce biogeoclimatic zones of southeastern British Columbia. Growth, expressed as percent of stem volume at the start of each period, decreased significantly as resinosis increased due to mycelial colonization of the tree base. It was highest in resinosis severity class 0 (healthy), lowest in classes 3 (greater than 50-100% of basal circumference showing resinosis) and 4 (recently killed, 100% resinosis), and intermediate in classes 1 (no basal resinosis but root s infected within 1 m of root collar) and 2 (less than or equal to 50% basal resinosis). Differences among classes were greatest for the past 5-yr period and least, though still significant, for the past 15-yr period. Trends during the past 30 yr showed greater declines in severity classes 3 and 4 relative to class 0 than in classes 1 and 2. The period in which decline was initiated also occurred earlier (up to 25 yr ago) in classes 3 and 4 than in other classes. The percentage of basal circumference that was affected by lesion was strongly related to percent roots infected but only weakly to percent volume growth. The relation of percent basal circumference affected by lesion to percent volume growth was greatly strengthened by including the period in which decline was initiated in the regression equation. *Phytopathology*. Apr 1989. v. 79 (4). p. 482-487. maps. Includes references. (NAL Call No.: DNAL 464.8 P56).

4846

### **Relationship of symbiotic fungi to southern pine beetle population trends.**

Bridges, J.R. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 127-135. Includes references. (NAL Call No.: DNAL aSD11.U57).

4847

### **Relationships of dwarf mistletoes and intermediate stand cultural practices in the Northern Rockies.**

XGTIA. Wicker, E.F. Hawksworth, F.G. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT. Apr 1988. (243). p. 298-302. Includes references. (NAL Call No.:

DNAL aSD11.A48).

4848

### **Relative effect of seed and cone insects on ponderosa pine in northern Arizona.**

JEENAI. Blake, E.A. Wagner, M.R.; Koerber, T.W. Lanham, Md. : Entomological Society of America. A total of 2,548 second-year cones were collected from 10 ponderosa pine, *Pinus ponderosa* Dougl. ex Laws., trees at each of five representative stands in northern Arizona in fall 1984. Five insect species were responsible for cone mortality and seed destruction. *Dioryctria auranticella* Grote (Lepidoptera: Pyralidae) caused the most mortality, killing all of the cones on some individual trees. On a plot average basis, this species was responsible for 38.7-81.0% of the cone mortality. Less (but still substantial) cone mortality was caused by *Conophthorus ponderosae* Hopkins (Coleoptera: Scolytidae) and *Conotrachelus neomexicana* Fall (Coleoptera: Curculionidae). *Cydia piperana* (Kearfott) (Lepidoptera: Olethreutidae) destroyed 1.3-7.6 seeds per cone in the cones that survived. Radiographic examination of apparently normal seeds from surviving cones showed that 46.0-70.0% were destroyed by *Megastigmus albifrons* Walker (Hymenoptera: Torymidae). In combination, these five insect species dramatically reduced the production of ponderosa pine seeds at the locations studied. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1691-1694. Includes references. (NAL Call No.: DNAL 421 J822).

4849

### **Relative effects of small and large disturbances on temperate hardwood forest structure.**

ECOLA. Lorimer, C.G. Tempe, Ariz. : The Society. Ecology : a publication of the Ecological Society of America. June 1989. v. 70 (3). p. 565-567. (NAL Call No.: DNAL 410 EC7).

4850

### **Relative growth rate and plant habit of Linden taxa.**

Pellett, H. Vogel, K.; McNamara, S.; Zuzek, K. Washington, D.C. : Horticultural Research Institute. *Journal of environmental horticulture*. June 1988. v. 6 (2). p. 48-52. ill. Includes references. (NAL Call No.: DNAL SB1.J66).

4851

### **Remedial treatment of lodgepole pine infested with mountain pine beetle: efficacy of three insecticides.**

Tilden, P.E. Berkeley, Calif. : The Station. USDA Forest Service research note PSW - Pacific Southwest Forest and Range Experiment Station.

May 1985. (374). 4 p. Includes references. (NAL Call No.: DNAL A99.9 F7652).

4852

**Reproduction in Polemonium: patterns and implications of floral nectar protection and standing crops.**

AJBDA. Zimmerman, M. Pyke, G.H. Baltimore, Md. : Botanical Society of America. American journal of botany. Oct 1986. v. 73 (10). p. 1405-1415. Includes references. (NAL Call No.: DNAL 450 AM36).

4853

**Reproductive enhancement by adult feeding: effects of honeydew in imbibed water on spruce budworm.**

JLPSA. Miller, W.E. Los Angeles, Calif. : The Society. Journal of the Lepidopterists' Society. 1989. v. 43 (3). p. 167-177. Includes references. (NAL Call No.: DNAL 421 L554).

4854

**A requirement for sucrose in xylem sap flow from dormant maple trees.**

PLPHA. Johnson, R.W. Tyree, M.T.; Dixon, M.A. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. June 1987. v. 84 (2). p. 495-500. ill. Includes references. (NAL Call No.: DNAL 450 P692).

4855

**Research and education: introduction.**

MUCBA. Montgomery, B.A. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 31. (NAL Call No.: DNAL 275.29 M58B).

4856

**Research on tree growth regulators has exciting implications for horticulture.**

ANURA. Watson, M.R. Chicago, Ill. : American Nurseryman Publishing Co. American nurseryman. July 15, 1987. v. 166 (2). p. 70-79. ill. (NAL Call No.: DNAL 80 AM371).

4857

**Residual toxicity of a high-potency formulation of *Bacillus thuringiensis* to spruce budworm (Lepidoptera: Tortricidae).**

JEENAI. Van Frankenhuyzen, K. Nystrom, C. Lanham, Md. : Entomological Society of America. Foliar persistence of an aqueous high-potency formulation of *Bacillus thuringiensis* (Thuricide 48LV) applied to a white spruce (*Picea glauca* Moench.) plantation at 2.4 liter/ha was assessed. Residual toxicity of treated foliage to spruce budworm, *Choristoneura fumiferana* (Clemens), larvae was less than 2 d despite high spray deposition on the target foliage. Experiments with potted balsam fir indicated that wash-off by rain was the primary cause for loss of residual toxicity, whereas inactivation by sunlight played a limited role. As little as 6 mm of rain caused a substantial loss of residual toxicity. We conclude that deposits of Thuricide 48LV (low viscosity) on white spruce and balsam fir (*Abies balsamea* L.) foliage are highly susceptible to wash-off by rain. A high concentration of active ingredient does not improve foliar persistence and a suitable sticker is required. Journal of economic entomology. June 1989. v. 82 (3). p. 868-872. Includes references. (NAL Call No.: DNAL 421 J822).

4858

**Residues from organic arsenical herbicides in chemically thinned forests.**

JEVQAA. Newton, M. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1986. v. 15 (4). p. 388-394. Includes references. (NAL Call No.: DNAL QH540.J6).

4859

**Residues of lindane and chlorpyrifos in firewood and woodsmoke.**

JESCEP. Bush, P.B. Taylor, J.W.; McMahon, C.K.; Neary, D.G. Tifton, Ga. : The Entomological Science Society. Journal of Entomological Science. Apr 1987. v. 22 (2). p. 131-139. Includes references. (NAL Call No.: DNAL QL461.G4).

4860

**Resistance of plants at the population level to attack by phytophagous insects.**

Lunderstadt, J. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 131-137. ill. Includes references. (NAL Call No.: DNAL SB761.M46).



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4861

**Resistance of ponderosa pine to the gouty pitch midge (*Cecidomyia piniinopis*).**

XFIPA. Hoff, R.J. Ogden, Utah : The Station. USDA Forest Service research paper INT - Intermountain Research Station. Feb 1988. (387). 3 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764U).

4862

**Respirometric testing of decay resistance of discolored root wood.**

PHYTAU. Worrall, J.J. Harrington, T.C. St. Paul, Minn. : American Phytopathological Society. Phytopathology. June 1988. v. 78 (6). p. 676-682. Includes references. (NAL Call No.: DNAL 464.8 P56).

4863

**Response of advance regeneration to release in the Inland Mountain West: a summary.**

XGTIA. McCaughey, W.W. Ferguson, D.E. Ogden, Utah : The Station. General technical report INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Paper presented at "Future Forests of the Mountain West : A Stand Culture Symposium," Sept 29-Oct 3, 1986, Missoula, MT.~ Literature review. Apr 1988. (243). p. 255-266. Includes references. (NAL Call No.: DNAL aSD11.A48).

4864

**Response of *Cornus Florida* to moisture stress.**

JOARD. Williams, J.D. Ponder, H.G.; Gilliam, C.H. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1987. v. 13 (4). p. 98-101. Includes references. (NAL Call No.: DNAL SB436.U6).

4865

**Response of forest vegetation and seedlings to chemical site preparation--first year.**

PNWSB. Maass, D. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January, 6-8, 1988, Hartford, Connecticut. 1988. v. 42 (suppl.). p. 48-57. Includes references. (NAL Call No.: DNAL 79.9 N814).

4866

**Response of Gambel oak to tebuthiuron in central Utah.**

XFINA. Clary, W.P. Goodrich, S.; Smith, B.M. Ogden, Utah : The Station. USDA Forest Service research note INT - United States Intermountain Forest and Range Experiment Station. Apr 1985. (351). 4 p. Includes references. (NAL Call No.: DNAL A99.9 F764UN).

4867

**Response of gypsy moth hemocytes to natural fungal protoplasts of three Entomophaga species (*Zygomycetes: Entomophthorales*).**

JIVPA. Butt, T.M. Humber, R.A. Duluth, Minn. : Academic Press. Journal of invertebrate pathology. Jan 1989. v. 53 (1). p. 121-123. ill. (NAL Call No.: DNAL 421 J826).

4868

**Response of *Hamamelis virginiana* L. to canopy gaps in a Pennsylvania oak forest.**

AMNAA. Hicks, D.J. Hustin, D.L. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1989. v. 121 (1). p. 200-204. Includes references. (NAL Call No.: DNAL 410 M58).

4869

**Response of herb layer cover to experimental canopy gaps.**

AMNAA. Collins, B.S. Pickett, S.T.A. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Apr 1988. v. 119 (2). p. 282-290. Includes references. (NAL Call No.: DNAL 410 M58).

4870

**Response of mountain pine beetle, *Dendroctonus ponderosae* Hopkins, and pine engraver, *Ips pini* (Say), to ipsdienol in southwestern British Columbia.**

JCECD. Hunt, D.W.A. Borden, J.H. New York, N.Y. : Plenum Press. Journal of chemical ecology. Jan 1988. v. 14 (1). p. 277-293. Includes references. (NAL Call No.: DNAL QD415.A1J6).

4871

**Response of newly planted loblolly pines to herbicide and nitrogen.**

SJAFD. McKee, W.H. Jr. Wilhite, L.P. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Feb 1988. v. 12 (1). p. 33-36. Includes references. (NAL Call No.: DNAL SD1.S63).

4872

**Response of northwestern hardwoods, shrubs, and Douglas-fir to arsenal and escort.**

WSWPA. Cole, E.C. Newton, M.; White, D.E. Reno : The Society. Proceedings - Western Society of Weed Science. Paper presented at the annual meeting of the Western Society of Weed Science, March 18-20, 1986, San Diego, California. 1986. v. 39. p. 93-101. Includes references. (NAL Call No.: DNAL 79.9 W52).

4873

**Response of *Plagithymysus bilineatus* Sharp (Coleoptera: Cerambycidae) to healthy and stressed ohia trees.**

PPETA9. Stein, J.D. Nagata, R.F. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. Oct 1986. v. 62 (4). p. 344-349. Includes references. (NAL Call No.: DNAL 421 P193).

4874

**Response of selected plant species to nickel in western North Carolina.**

CSTNA. Milton, N.M. Purdy, T.L. Morgantown, W.Va. : Southern Appalachian Botanical Club. Castanea. Sept 1988. v. 53 (3). p. 207-214. maps. Includes references. (NAL Call No.: DNAL 450 S082).

4875

**Response of smaller European elm bark beetles to pruning wounds on American elm.**

JOARD. Barger, J.H. Cannon, W.N. Jr. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Apr 1987. v. 13 (4). p. 102-104. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

4876

**Response of songbirds to glyphosate-induced habitat changes on clearcuts.**

JWMAA9. Santillo, D.J. Brown, P.W.; Leslie, D.M. Jr. Bethesda, Md. : Wildlife Society. Journal of wildlife management. Jan 1989. v. 53 (1). p. 64-71. Includes references. (NAL Call No.: DNAL 410 J827).

4877

**Response of spruce budworm (Lepidoptera: Tortricidae) infected with *Nosema fumiferanae* (Microsporidia) to *Bacillus thuringiensis* treatments.**

EVETEX. Bauer, L.S. Nordin, G.L. Lanham, Md. : Entomological Society of America. Disease in spruce budworm, *Choristoneura fumiferana* (Clemens), caused by the microsporidian *Nosema fumiferanae* (Thomson), increased larval susceptibility to mortality by *Bacillus thuringiensis* (Berliner) treatments compared with larvae free of *N. fumiferanae* disease. The median lethal concentration (LC50) of *B. thuringiensis*, as determined by the diet incorporation bioassay method, was significantly lower for larvae infected transovarially with *N. fumiferanae*, but the similar slope obtained for initially healthy larvae indicated an independent and additive interaction. The median lethal time (LT50) for *B. thuringiensis* was shortest for the group diseased with *N. fumiferanae*. Results from separate and sequential oral treatments

(horizontal transmission) of both microorganisms at fixed physiological stages support the findings from the transovarial studies. It also was determined that *N. fumiferanae*-free larvae surviving *B. thuringiensis* treatments were more susceptible to mortality from subsequent inoculations with *N. fumiferanae* than were larvae not previously exposed to *B. thuringiensis*. Environmental entomology. Oct 1989. v. 18 (5). p. 816-821. Includes references. (NAL Call No.: DNAL QL461.E532).

4878

**Response of the southern pine bark beetle guild (Coleoptera: Scolytidae) to host disturbance.**

EVETEX. Coulson, R.N. Flamm, R.O.; Pulley, P.E.; Payne, T.L.; Rykiel, E.J.; Wagner, T.L. College Park, Md. : Entomological Society of America. Environmental entomology. Aug 1986. v. 15 (4). p. 850-858. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

4879

**Response of tree growth to changes in flooding regime in a mixed hardwood bottomland forest in southern Illinois.**

Brown, S. Urbana-Champaign : Dept. of Forestry, University of Illinois, 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 203-208. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

4880

**Response of woody swamp seedlings to flooding and increased water temperatures. I. Growth, biomass, and survivorship.**

AJBDA. Donovan, L.A. McLeod, K.W.; Sherrrod, K.C. Jr.; Stumpff, N.J. Columbus, Ohio : Botanical Society of America. American journal of botany. Aug 1988. v. 75 (8). p. 1181-1190. Includes references. (NAL Call No.: DNAL 450 AM36).

4881

**Response of *Zeiraphera canadensis* (Lepidoptera: Tortricidae: Olethreutinae) to candidate sex attractants and factors affecting trap catches.**

EVETEX. Turgeon, J.J. Grant, G.G. College Park, Md. : Entomological Society of America. Environmental entomology. June 1988. v. 17 (3). p. 442-447. Includes references. (NAL Call No.: DNAL QL461.E532).



(FORESTRY RELATED)

4882

**Response to removal of competing vegetation in slash pine plantations.**  
SWSPBE. Rheney, J.W. Shiver, B.D.; Pienaar, L.V. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 246-252. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

4883

**Responses of cherrybark oak seedlings to short-term flooding.**  
FOSCA. Pezeshki, S.R. Chambers, J.L. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1985. v. 31 (3). p. 760-771. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4884

**Responses of the herb layer to the gap dynamics of a mature beech-maple forest.**  
AMNAA. Moore, M.R. Vankat, J.L. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Apr 1986. v. 115 (2). p. 336-347. Includes references. (NAL Call No.: DNAL 410 M58).

4885

**Responses of vegetation and deer forage following application of hexazinone.**  
SJAFFD. Blake, P.M. Hurst, G.A.; Terry, T.A. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Nov 1987. v. 11 (4). p. 176-180. ill. Includes references. (NAL Call No.: DNAL SD1.S63).

4886

**Results from a volume delivery/droplet size study with aerially applied glyphosate.**  
PNWSB. Schaertl, G.R. Maass, D.I.; McCormack, M.L. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January, 6-8, 1988, Hartford, Connecticut. 1988. v. 42 (suppl.). p. 68-73. Includes references. (NAL Call No.: DNAL 79.9 N814).

4887

**Results of a hexazinone-mechanical site preparation trial.**  
PNWSB. Reynolds, P.E. MacKay, T.S.; McCormack, M.L. Jr. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1986. v. 40. p. 222A-229. Includes references. (NAL Call No.: DNAL 79.9 N814).

4888

**Review of foliage protection spray operations against the spruce budworm with *Bacillus thuringiensis kurstakii* from 1980 to 1983 in Nova Scotia and New Brunswick, Canada.**  
XGNEA. Kettela, E.G. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 19-22. Includes references. (NAL Call No.: DNAL aSD11.U56).

4889

**Rhabdocline needlecast and its control.**  
Clarke, B.B. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1987. (183). 2 p. ill. (NAL Call No.: DNAL S544.3.N5F7).

4890

**Rhyacionia zozana (Lepidoptera: Tortricidae), host of Hockeria tenuicornis (Hymenoptera: Chalcididae) in Oregon.**  
PPETA9. Halstead, J.A. Niwa, C.G. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. July 1987. v. 63 (3). p. 276-277. Includes references. (NAL Call No.: DNAL 421 P193).

4891

**Riparian plant communities of the Fort Bayard watershed in southwestern New Mexico.**  
SWNAA. Medina, A.L. Austin : Southwestern Association of Naturalists. The Southwestern naturalist. Sept 11, 1986. v. 31 (3). p. 345-359. ill. Includes references. (NAL Call No.: DNAL 409.6 S08).

4892

**Risk assessment of investments in loblolly pine plantations threatened by bark beetles.**  
Anderson, W.C. Guldin, R.W.; Vasievich, J.M. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 328-334. Includes references. (NAL Call No.: DNAL aSD11.U57).

4893

**Risk prediction of loblolly pine decline on littleleaf disease sites in South Carolina.**  
PLDIDE. Oak, S.W. Tainter, F.H. St. Paul, Minn. : American Phytopathological Society. Plant disease. Apr 1988. v. 72 (4). p. 289-293. ill. Includes references. (NAL Call No.: DNAL 1.9 P69P).

4894

**Risk-rating procedures: the significance of forest inventory information.**  
XGNEA. Olson, C.E. Jr. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 165-169. Includes references. (NAL Call No.: DNAL aSD11.U56).

4895

**The role of alkanes in epicuticular wax relative to tolerance of pine species to saline spray.**  
FOSCA. Simini, M. Leone, I.A. Washington, D.C. : Society of American Foresters. Forest science. June 1986. v. 32 (2). p. 487-492. Includes references. (NAL Call No.: DNAL 99.8 F7632).

4896

**The role of biochemical measurements in evaluating vigor.**  
Zaerr, J.B. Corvallis : Forest Research Laboratory, Oregon State University, 1985. Evaluating seedling quality : principles, procedures, and predictive abilities of major tests : proceedings of the workshop held October 16-18, 1984 / Mary L. Duryea, editor. p. 137-141. Includes references. (NAL Call No.: DNAL SD404.E93).

4897

**The role of boreal forests in atmosphere-biosphere exchange of carbon dioxide.**  
D'Arrigo, R. Jacoby, G.C.; Fung, I.Y. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 475-484. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

4898

**Role of competing vegetation in forest health.**  
Boyer, W.D. Bethesda, Md. : The Society. Proceedings of the... Society of American Foresters National Convention. 1986. p. 235-239. Includes references. (NAL Call No.: DNAL SD143.S64).

4899

**The role of elicitors in ectomycorrhizal formation.**  
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JEENAI. Stein, J.D. Tilden, P.E. College Park, Md. : Entomological Society of America. Journal of economic entomology. Oct 1987. v. 80 (5). p. 1076-1078. Includes references. (NAL Call No.: DNAL 421 J822).

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**Soil factors and efficacy of hexazinone formulations for loblolly pine (Pinus taeda) release.**

WEESA6. Minogue, P.J. Zutter, B.R.; Gjerstad, D.H. Champaign, Ill. : Weed Science Society of America. Abstract: Broadcast applications of hexazinone 3-cyclo-hexy -6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1H,3H)-dione pellets and foliar sprays were tested at four rates for hardwood control and safety to loblolly pine (Pinus taeda L.) at each of eight study locations differing in soil characteristics. Reduction in the number of hardwoods in the stand (hardwood density reduction) was greater with the pellet on soils with more than 60% sand, while the liquid formulation was most efficacious for finely textured soils. Hardwood density reduction with the pellet was negatively correlated with percent silt, clay, soil organic matter, and cation exchange capacity, and positively correlated with percent sand. With foliar sprays, hardwood density reduction was positively correlated with hexazinone rate and negatively correlated with soil pH. Pine mortality was positively correlated to percent sand with the pellet and negatively correlated to soil pH with broadcast sprays. Regression models incorporating pine height, herbicide rate, soil texture, cation exchange capacity, soil organic matter, and acidity could explain up to 78% of the variation in hardwood density change and 77% of the variation in pine mortality. Selective control of hardwoods in young loblolly pine stands is a function of hexazinone rate, formulation, and various soil factors. Weed science. May 1988. v. 36 (3). p. 399-405. Includes references. (NAL Call No.: DNAL 79.8 W41).



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CSOSA2. Florence, L.Z. Dancik, B.P. New York, N.Y. : Marcel Dekker. Communications in soil science and plant analysis. May/Sept 1988. v. 19 (7/12). p. 1105-1116. Includes references. (NAL Call No.: DNAL S590.C63).

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JOARD. Kozlowski, T.T. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Literature review. Feb 1987. v. 13 (2). p. 39-46. Includes references. (NAL Call No.: DNAL SB436.J6).

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XGTIA. McElroy, F.D. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. June 1985. (185). p. 102-104. Includes references. (NAL Call No.: DNAL aSD11.A48).

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JOARD. Deubert, K.H. Corte-Real, I. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Nov 1986. v. 12 (11). p. 269-272. Includes 13 references. (NAL Call No.: DNAL SB436.J6).

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GTRWD. Mader, D.L. Washington, D.C. : The Service. General technical report WO - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14,

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### **Soil solar heating for control of damping-off fungi and weeds at the Colorado State Forest Service Nursery.**

TPLNA. Hildebrand, D.M. Washington, D.C. : The Service. Tree planters' notes - United States, Forest Service. Winter 1985. v. 36 (1). p. 28-34. ill. Includes 24 references. (NAL Call No.: DNAL 1.962 C5T71).

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### **Soil solar heating for reduction in populations of Pythium, Fusarium, nematodes, and weeds at the U.S. Forest Service Bessey Tree Nursery, Halsey, Nebraska.**

Hildebrand, D.M. Denver : The Service. Technical report R2 - United States Forest Service, Forest Pest Management. Sept 1985. (34). 20 p. Includes references. (NAL Call No.: DNAL aSD11.A422).

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SJAFD. Miller, J.H. Bethesda, Md. : Society of American Foresters. Southern journal of applied forestry. Aug 1988. v. 12 (3). p. 199-203. Includes references. (NAL Call No.: DNAL SD1.S63).

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### **Soils and conifer forest productivity on serpentinized peridotite of the Trinity ophiolite, California.**

SOSCAK. Alexander, E.B. Adamson, C.; Zinke, P.J.; Graham, R.C. Baltimore, Md. : Williams & Wilkins. Soil science. Dec 1989. v. 148 (6). p. 412-423. maps. Includes references. (NAL Call No.: DNAL 56.8 S03).

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### **Soils and productivity of lodgepole pine.**

Cochran, P.H. Pullman, Wash. : Cooperative Extension, Washington State University, 1985. Lodgepole pine--the species and its management : symposium proceedings, May 8-10, 1984 Spokane, Washington, USA; repeated May 14-16, 1984 Vancouver, British Columbia, Canada / comp./ed. by D.M. Baumga. p. 89-93. Includes references. (NAL Call No.: DNAL SD397.P585L6)

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XGTIA. Cooley, S.J. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. June 1985. (185). p. 45-48. ill. Includes references. (NAL Call No.: DNAL aSD11.A48).

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Bissell, T.L. Baltimore, Md. : Maryland Entomological Society. Maryland entomologist. 1987. p. 10-13. ill. Includes references. (NAL Call No.: DNAL QL461.M37).

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**Some negative aspects of using *Bacillus thuringiensis* Berliner in operational programs against the gypsy moth (*Lepidoptera: Lymantriidae*).**

XGNEA. Kegg, J.D. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Symposium: Microbial Control of Spruce Budworms and Gypsy Moths," April 10-12, 1984, Windsor Locks, CT. 1985. (100). p. 33-34. (NAL Call No.: DNAL aSD11.U56).

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PHESA. Reimer, N.U. Beardsley, J.W. Honolulu : The Society. Proceedings of the Hawaiian Entomological Society. Dec 15, 1986. v. 27. p. 91-93. Includes references. (NAL Call No.: DNAL 420 H312).

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NAHIA. Mohlenbrock, R.H. New York, N.Y. : American Museum of Natural History. Natural history. Jan 1989. (1). p. 58-60. ill. (NAL Call No.: DNAL 500 N483J).

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**Sources of variation in osmotic potentials with special reference to North American tree species.**

FOSCA. Abrams, M.D. Bethesda, Md. : Society of American Foresters. The purpose of this review is to discuss sources of variation in osmotic potentials ( $\psi$  pi), with special reference to North American tree species. Lowering of osmotic potentials by solute accumulation (osmotic adjustment) has been reported in a wide variety of tree species during drought, but not in all species. Osmotic potentials at zero turgor for 37 tree species throughout the United States and Canada averaged (+/- s.e.) -2.06 +/- 0.13 MPa and -2.54 +/- 0.06 MPa for



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leaves or shoots under moist and dry conditions, respectively. The low standard error associated with the mean values suggest that, as a group, North American trees develop fairly similar osmotic potentials for a range of moisture conditions. Substantial solute accumulation often routinely occurs in developing leaves and in over-wintering leaves. Drought preconditioning can increase physiological activity in plants during subsequent drought by lowering  $\psi$ . However, if drought is imposed too rapidly osmotic adjustment may not occur. Physiological plasticity in trees may cause variations in  $\psi$  in responses to light regime and leaf canopy position. Light and nutrient regimes that promote high net photosynthesis should also promote the ability to osmotically adjust. However, stomatal responses and growth during water and nutrient stress may be unrelated to osmotic potentials because of species differences in rooting and water transport, guard cell turgor not being closely coupled with that of the bulk leaf, and changes in plant growth regulator concentrations. When examining changes in osmotic potentials using pressure-volume curves, it is important to rehydrate plant material to a water potential characteristic for that species at full hydration in the field. Moreover, as with most physiological measurements, sampling variation in light regime, canopy position, nutrient status, temperature, age, phenology, drought history, and diurnal timing of harvesting of the leaves and shoots should be minimized. *Forest science*. Dec 1988. v. 34 (4). p. 1030-1046. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Southern pine bark beetles in the urban environment.**

JOARD. Cameron, R.S. Urbana, Ill. : International Society of Arboriculture. *Journal of arboriculture*. June 1987. v. 13 (6). p. 145-151. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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Flamm, R.D. Coulson, R.N.; Payne, T.L. New York : Plenum Press, c1988. Dynamics of forest insect populations : patterns, causes, implications / edited by Alan A. Berryman. Literature review. p. 531-553. ill., maps. Includes references. (NAL Call No.: DNAL SB761.D96).

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### **The southern pine beetle decision support system.**

Sauders, M.C. Loh, D.K.; Rykiel, E.J.; Coulson, R.N.; Payne, T.L.; Pulley, P.E.; Sharpe, P.J.H.; Hu, L. Florence, Ala. : The Institute, c1985. Software solutions : proceedings:

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Longenecker, W.H. Beltsville, Md. : The Library. Quick bibliography series - National Agricultural Library (U.S.). Bibliography. Feb 1987. (87-13). 28 p. (NAL Call No.: DNAL aZ5071.N3).

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AKFRAC. Stephen, F.M. Lih, M.P.; Wallis, G.W. Fayetteville, Ark. : The Station. Arkansas farm research - Arkansas Agricultural Experiment Station. Nov/Dec 1988. v. 37 (6). p. 5. (NAL Call No.: DNAL 100 AR42F).

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### **Southern pine beetle prevention and control measures for nonindustrial private landowners in South Carolina.**

XFGSA. Remion, M.C. Boone, A.J. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 45-49. ill. Includes references. (NAL Call No.: DNAL aSD433.A53).

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XFGSA. Billings, R.F. Bryant, C.M.; Pase, V.H.A. III; Wilson, K.A.; Walker, C. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 55-63. ill., maps. Includes references. (NAL Call No.: DNAL aSD433.A53).

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**Spacing effects on seedlings of northern red oak and yellow-poplar.**

TPUNA. Kolb, T.E. Steiner, K.C. Washington, D.C. : The Service. Tree planters' notes - U.S. Department of Agriculture, Forest Service. Summer 1989. v. 40 (3). p. 3-4. Includes references. (NAL Call No.: DNAL 1.962 C5T71).

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**SPB-MICROBEETLES: a simulation system for evaluating economic performance of management alternatives for stands attacked by Southern Pine beetles.**

Thompson, W.A. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 292-299. Includes references. (NAL Call No.: DNAL aSD11.U57).

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FOSCA. Schoonmaker, P. McKee, A. Bethesda, Md. : Society of American Foresters. Species diversity and community composition were studied at 23 sites on similar western hemlock/Douglas-fir forest habitats, in undisturbed old-growth stands and stands at 2, 5, 10, 15, 20, 30, and 40 years after clearcutting, broadcast burning, and planting with Douglas-fir. Vegetation was sampled with three 5 X 60 m transects at each site. Invading herbs, then invading and residual shrubs, and finally conifers dominated through the first 30 years. Late seral species, which account for 99% of cover in old-growth stands, are nearly eliminated immediately following disturbance, but account for almost 40% of vegetative cover after 5 years, 66% after 10 years, 83% after 20

years, and 97% at 40 years. After an initial drop following disturbance, species diversity trends weakly upward with heterogeneity peaking at 15 years and richness at 20 years. This initially high diversity (higher than that of old-growth stands) is short-lived. After the tree canopy closes, species diversity declines reaching its lowest values at 40 years. Only two species were eradicated after disturbance, both mycotrophs. Pacific Northwest old-growth forests are relatively poor in species, but moderately high in heterogeneity values. FOR. SCI. 34(4):960-979. Forest science. Dec 1988. v. 34 (4). p. 960-979. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Spectral characteristics of tree components of balsam fir and spruce damaged by spruce budworm.**

FOSCA. Leckie, D.G. Ostaff, D.P.; Teillet, P.M.; Fedosjevs, G. Bethesda, Md. : Society of American Foresters. Spectral reflectances from 360 to 1100 nm at 5 nm intervals in 6 nm bands were measured with a laboratory spectrometer for samples of the components of balsam fir and white spruce trees defoliated by the spruce budworm. These components included current-year needles, 1-year-old needles, 2-year and older needles, budworm feeding debris, twigs, bark, and lichen. Current-year needles had significantly higher reflectances than older needles in the green and yellow parts of the spectrum. Feeding debris, which is visually red, had a smooth spectral curve of increasing reflectance with wavelength. The greatest difference between needles and feeding debris was in the short near-infrared wavelengths and at the chlorophyll absorption maximum near 670 nm. The reflectance of twigs and bark changed with age and exposure to weathering. Variability in their reflectance was large. There were no distinct narrow band features of twig or feeding debris reflectance, which would be characteristic of defoliation. Lichen is highly reflective, and its presence on branches of defoliated trees will greatly alter branch reflectance characteristics. Changes in spectral reflectance of trees throughout the various stages of a spruce budworm outbreak depend on a complex interrelationship of the reflectances of individual components which, in turn, are complex and changing. Forest science. June 1989. v. 35 (2). p. 582-600. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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EVETEX. Fuester, R.W. Taylor, P.B.; Eisenberg, A. Lanham, Md. : Entomological Society of America. Females of *Coccygomimus disparis* (Viereck) were exposed to laboratory-reared prepupae and pupae (1-9 d old) of the gypsy moth, *Lymantria dispar* (L.), in a choice test to determine the optimal host age for parasitism. The frequency of visits by parasites and successful parasitism in a 2-h exposure period were high for all age classes of pupae but markedly lower for prepupae. Incidence of parasitism appeared to be higher on male hosts than female hosts, but the sex ratios were similarly skewed toward females in progeny emerging from hosts of both sexes. Development of more than one parasite per host was very rare. Host mortality caused by dehydration was higher in prepupae than in pupae but did not appear to be caused by parasite activity, nor did mortality from disease. Host mortality from unknown causes was much higher in hosts that were known to have been visited than in those that were not, suggesting that some of this mortality should be attributed to parasite activity. Environmental entomology. Apr 1989. v. 18 (2). p. 338-341. Includes references. (NAL Call No.: DNAL QL461.E532).

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JEENAI. Van Frankenhuyzen, K. Fast, P.G. Lanham, Md. : Entomological Society of America. Susceptibility of three *Choristoneura* species to the HD-1 and NRD-12 strains of *Bacillus thuringiensis* var. *kurstaki* Berliner was compared using the diet-incorporation method. Susceptibility of *C. fumiferana* (Clemens) and *C. pinus* Freeman did not differ significantly, whereas *C. occidentalis* Freeman was significantly more susceptible to preparations produced in our laboratory and commercial formulations. There was no significant difference between pathogenicity of HD-1 and NRD-12 for any of the budworm species. That *C. occidentalis* was more susceptible than *C. fumiferana* also was demonstrated in assays with treated foliage of balsam fir, *Abies balsamea*.

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AMFOA. Bolgiano, C. Washington, D.C. : American Forestry Association. *American forests*. Mar/Apr 1989. v. 95 (3/4). p. 36-41. ill., maps. (NAL Call No.: DNAL 99.8 F762).

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### **Technology transfer through demonstration projects: hazard rating stands for southern pine beetle and annosus root rot in Alabama.**

XFGSA. Hyland, J.R. Kucera, R.C. Asheville, N.C. : The Station. USDA Forest Service general technical report SE - United States, Southeastern Forest Experiment Station. Dec 1985. (34). p. 7-11. ill. Includes references. (NAL Call No.: DNAL aSD433.A53).

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### **Temperature and crowding effects on virus manifestatin in Neodiprion sertifer (Hymenoptera: Diprionidae) larvae.**

GRLEA. Mohammed, M.A. Coppel, H.C.; Podgwaite, J.D. East Lansing, Mich. : Michigan Entomological Society. The Great Lakes entomologist. Autumn 1985. v. 18 (3). p. 115-118. Includes references. (NAL Call No.: DNAL QL461.M5).

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EVETEX. Weseloh, R.M. Lanham, Md. : Entomological Society of America. Three models (linear, third-degree polynomial, and one based on enzyme kinetics) were used to simulate the dependence of Calosoma sycophanta L. developmental rate on temperature. In conjunction with a model of individual differences in development based on the Weibull distribution, the models were used to predict development of C. sycophanta at fluctuating temperatures in a greenhouse and in nature. In the greenhouse, the reaction-rate model based on enzyme kinetics was most consistently correct. Simulated development was 1-2 d faster than actual, but this may have been partly because of the large fraction of time greenhouse temperatures were below 20 degrees C. Simulations for one set of field data had to be adjusted for the time of larval hatch, but the same adjustment gave a good simulation of independent data. One or more of the temperature-based models, in conjunction with other studies on food consumption, may prove useful in measuring the effect of this predator on gypsy moths. Environmental entomology. Dec 1989. v. 18 (6). p. 1105-1111. Includes references. (NAL Call No.: DNAL QL461.E532).

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### **Temperature-mediated programming of activity rhythms in male gypsy moths (Lepidoptera: Lymantriidae): implications for the sterile male technique.**

EVETEX. Lance, D.R. Odell, T.M.; Mastro, V.C.; Schwalbe, C.P. College Park, Md. : Entomological Society of America. In previous mark-recapture studies, laboratory-reared male gypsy moths, Lymantria dispar (L.), tended to arrive at pheromone sources 1-3 h later than feral males. In this study, laboratory-reared male pupae were exposed to five different temperature regimes, the resulting adults were tested in an actograph at 25 degrees C. Males that had been held at lower temperatures as pupae became active earlier than males that had been held in warmer treatments. In subsequent mark-recapture trials, males from all treatments were captured at pheromone sources earlier on warm days than on cool ones; however, on any given day, males from lower pupal temperature regimes were captured consistently earlier than males from warmer regimes. Temperature-mediated programming provides a potential means of synchronizing activity rhythms of sterile males with those of wild males in target populations. Environmental entomology. Aug 1988. v. 17 (4). p. 649-653. Includes references. (NAL Call No.: DNAL QL461.E532).

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### **Temperature requirements for development of the jack pine budworm (Lepidoptera: Tortricidae) and two of its parasitoids (Hymenoptera).**

JEENAI. Lysyk, T.J. Nealis, V.G. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1988. v. 81 (4). p. 1045-1051. Includes references. (NAL Call No.: DNAL 421 J822).

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### **Temporal and spatial activity patterns of an adult parasitoid, Glypta fumiferanae (Hymenoptera: Ichneumonidae), and their influence on parasitism.**

EVETEX. Nyrop, J.P. Simmons, G.A. College Park, Md. : Entomological Society of America. Environmental entomology. June 1986. v. 15 (3). p. 481-487. ill. Includes references. (NAL Call No.: DNAL QL461.E532).

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### **Temporal and spatial patterns of fusiform rust epidemics in young plantations of susceptible and resistant slash and loblolly pines.**

PLDRA. Schmidt, R.A. Holley, R.C.; Klapproth, M.C.; Miller, T. St. Paul, Minn. : American Phytopathological Society. Plant disease. July 1986. v. 70 (7). p. 661-666. maps. Includes 24 references. (NAL Call No.: DNAL 1.9 P69P).

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**Temporal and spatial variation in infection of lodgepole pine by western gall rust.**

PLDIDE. Kamp, B.J. van der. St. Paul, Minn. : American Phytopathological Society. Plant disease. Sept 1988. v. 72 (9). p. 787-790. Includes references. (NAL Call No.: DNAL 1.9 P69P).

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**Temporary disturbance of translocation of assimilates in Douglas firs caused by low levels of ozone and sulfur dioxide.**

PLPHA. Gorissen, A. Veen, J.A. van. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Nov 1988. v. 88 (3). p. 559-563. Includes references. (NAL Call No.: DNAL 450 P692).

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**Ten-year risk-rating systems for California red fir and white fir development and use /George T. Ferrell.**

Ferrell, George T. Berkeley, Calif. : U.S. Dept. of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. 1989? . Cover title.~ "July 1989"--P. 2 of cover. 12 p. : ill. ; 22 cm. Includes bibliographical references (p. 12). (NAL Call No.: DNAL aSD11.A325 no.115).

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**Termites: biology, prevention, and control.**

WUEXA. Antonelli, A. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Jan 1989. (0787,rev.). 8 p. ill. (NAL Call No.: DNAL 275.29 W27P).

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**Terpene biosynthesis under pathological conditions.**

Cheniclet, C. Bernard-Dagan, C.; Pauly, G. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 117-130. ill. Includes references. (NAL Call No.: DNAL SB761.M46).

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**A test of basal sprays for controlling hardwood brush and trees.**

SWSPBE. McLemore, B.F. Cain, M.D. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988,

Tulsa, Oklahoma. 1988. v. 41. p. 180-186. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Testing basal applications of triclopyr in conjunction with conifer spacings.**

PNWSB. Maass, D. Arsenault, D. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1986. v. 40. p. 213-216. Includes references. (NAL Call No.: DNAL 79.9 N814).

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**Testing herbicides for kudzu eradication on a Piedmont site.**

SJAFD. Miller, J.H. Washington, D.C. : Society of American Foresters. Southern journal of applied forestry. May 1985. v. 9 (2). p. 128-132. Includes references. (NAL Call No.: DNAL SD1.S63).

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**Therapy for Dutch elm disease.**

JOARD. Lanier, G.N. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1988. v. 14 (9). p. 229-232. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Thermal damage to chloroplast envelope membranes.**

PLPHA. McCain, D.C. Croxdale, J.; Markley, J.L. Rockville, Md. : American Society of Plant Physiologists. Nuclear magnetic resonance was used to detect thermal injury to chloroplasts in vivo. A lesion occurs in the chloroplast envelope membrane at temperatures between 53 degrees C and 57 degrees C, depending on species, leaf condition, and heating rate. The injury is associated with a sudden loss of water from the chloroplast. Plant physiology. June 1989. v. 90 (2). p. 606-609. Includes references. (NAL Call No.: DNAL 450 P692).

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**Thermal flooding injury of woody swamp seedlings.**

JTBIDS. Donovan, L.A. Stumpff, N.J.; McLeod, K.W. Elmsford, N.Y. : Pergamon Press. Journal of thermal biology. July 1989. v. 14 (3). p. 147-154. Includes references. (NAL Call No.: DNAL QP82.2.T4J6).



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### **Thin-line treatment of red alder.**

Hibbs, D.E. Landgren, C.G. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Oct 1987. v. 2 (4). p. 130-131. Includes references. (NAL Call No.: DNAL SD388.W6).

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### **Thinning and harvesting practices to minimize site and stand disturbance and susceptibility to bark beetle and disease attacks.**

Nebeker, T.E. Hodges, J.D. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Symposium on Integrated Pest Management," Apr 15-18, 1985, Asheville, North Carolina. Aug 1985. (56). p. 263-271. ill. Includes references. (NAL Call No.: DNAL ASD11.U57).

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### **Thinning response of immature white pine.**

Gillespie, A.R. Hocker, H.W. Jr. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Dec. 1986. v. 3 (4). p. 148-150. Includes references. (NAL Call No.: DNAL SD143.N6).

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### **Thinning stagnated ponderosa and jeffrey pine stands in northeastern California: 30-year effects.**

Liliehalm, R.J. Teeguarden, D.E.; Gordon, D.T. Berkeley, Calif. : The Station. Research note PSW - U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. July 1989. (407). 6 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7652).

5152

### **Three-dimensional representation of Douglas-fir volume growth: comparison of growth and yield models with stand data.**

FOSCA. O'Hara, K.L. Oliver, C.D. Bethesda, Md. : Society of American Foresters. Growth and yield estimates for unthinned stands from the Douglas-fir Stand Simulator (DFSIM; Curtis et al. 1981) and the Tree and Stand Simulator (TASS; Mitchell and Cameron 1985) were used to construct graphical three-dimensional representations of Douglas-fir (*Pseudotsuga menziesii* Mirb. Franco) stand growth on site index 44 meter (50 year). The three-dimensional models used three variables: trees per hectare, breast height age, and either mean tree volume or stand volume. The TASS and DFSIM models were in agreement over most of their common range of age and number of trees. At wider spacings and older ages, however, the volumes predicted by

the DFSIM model exceeded those predicted by the TASS model by as much as 25%. Comparisons of these three-dimensional models to unthinned and thinned stand data from a similar site quality found the models to be reasonably accurate representations of unthinned stand growth. The thinned stands, however, had greater mean tree and stand volumes than those indicated by the TASS model for unthinned stands at similar spacings. Complete comparisons were not possible with the DFSIM model because of its limited range of number of trees. These results suggest the TASS model, and to a lesser extent, the DFSIM model may be underestimating the growth of widely spaced stands, or thinning may actually increase the growth of thinned trees over that of trees which had always grown at the post-thinning spacing. For. Sci. 34(3):724-743. Forest science. Sept 1988. p. 724-743. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Timber productivity of seven forest ecosystems in southeastern Alaska.**

XFPNA. Van Hees, W.W.S. Portland, Or. : The Station. USDA Forest Service research paper PNW-RP - United States, Pacific Northwest Research Station. Mar 1988. (391). 10 p. Includes references. (NAL Call No.: DNAL A99.9 F7625UNI).

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### **Time and materials needed to survey, inject systematic fungicides, and install root-graft barriers for Dutch elm disease management.**

Cannon, W.N. Jr. Barger, J.H.; Kostichka, C.J. Broomall, Pa. : The Station. USDA Forest Service Research Paper NE - United States, Northeastern Forest Experiment Station. 1986. (585). 6 p. Includes references. (NAL Call No.: DNAL A99.9 F7622UN).

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### **Time-dependent responses of trees to weather variations: an application of the Kalman filter.**

Visser, H. Molenaar, J. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 579-590. Includes references. (NAL Call No.: DNAL QK477.2.A615 1986).

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**Timing of longleaf pine seedling release from overtopping hardwoods: a look 30 years later.**  
SJAFD. Boyer, W.D. Washington, D.C. : Society of American Foresters. Southern journal of applied forestry. May 1985. v. 9 (2). p. 114-116. Includes references. (NAL Call No.: DNAL SD1.S63).

5157

**Timing of trunk-implanted acephate for protection of Douglas-fir from defoliation by the western spruce budworm.**  
Koerber, T.W. Sandquist, R.E. Bethesda, Md. : Society of American Foresters. Western journal of applied forestry. Oct 1988. v. 3 (4). p. 126-128. Includes references. (NAL Call No.: DNAL SD388.W6).

5158

**Tissue culture and leaf spot bioassays as variables in regression models explaining Hypoxylon mammatum incidence on Populus tremuloides clones in the field.**  
PHYTAJ. Belanger, R.R. Falk, S.P.; Manion, P.D.; Griffin, D.H. St. Paul, Minn. : American Phytopathological Society. Regression models were used to interpret the relationships among sensitivity of aspen to metabolites produced by Hypoxylon mammatum, disease incidence in the field, and several other clone and site variables. Twenty-nine naturally occurring aspen clones in central New York were intensively surveyed. Dormant buds of 10 clones representing the range of variation in infection were cultured and bioassayed with culture filtrates of H. mammatum to compare with bioassays of leaves collected in the field. Bioassay systems based on tissue culture and field collections demonstrated the occurrence of clonal differences in response to metabolites produced by H. mammatum. High positive correlations among bioassays, with various fungal isolates, supported the conclusion that clonal response to metabolites is genetically controlled. However, low correlations of toxin assays with various measures of disease did not support the theory of a direct relationship between disease incidence and toxin assays. Rather, an interaction of the toxin assay with other clonal and site variables in regression models was required to explain the variation in disease incidence in the field. Phytopathology. Mar 1989. v. 79 (3). p. 318-321. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**Tolerance of direct-seeded honey locust to preemergent herbicides in various soil types.**  
Geyer, W.A. Long, C.E. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1988. v. 6 (1) p. 4-6. Includes references. (NAL Call No.:

DNAL SB1.J66).

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**Tolerance of seedlings of Ponderosa pine, Douglas-fir, Grand fir, and Engelmann spruce for high temperatures.**  
NOSCA. Seidel, K.W. Pullman, Wash. : Washington State University Press. Northwest science. Feb 1986. v. 60 (1). p. 1-7. ill. Includes references. (NAL Call No.: DNAL 470 N81).

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**Tordon and Garlon herbicides effective for roadside brush control for forest access roads.**  
SWSPBE. Schutzman, L. Owen, W.; Kidd, F. Raleigh, N.C. : The Society. Proceedings - Southern Weed Science Society. 1986. (39th). p. 305-315. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Tordon and garlon herbicides: New applications and current use recommendations.**  
SWSPB. Kline, W.N. Hern, L.K.; . Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 157-163. (NAL Call No.: DNAL 79.9 S08).

5163

**Toxicity of host monoterpenes to Dendroctonus frontalis and Ips calligraphus (Coleoptera: Scolytidae).**  
JESCEP. Cook, S.P. Hain, F.P. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. July 1988. v. 23 (3). p. 287-292. Includes references. (NAL Call No.: DNAL QL461.G4).

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**The toxicity of Norway spruce monoterpenes to two bark beetle species and their associates.**  
Everaerts, C. Gregoire, J.C.; Merlin, J. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. p. 335-344. Includes references. (NAL Call No.: DNAL SB761.M46).



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5165

**Trace metal uptake and accumulation in trees as affected by environmental pollution /C.F. Baes and S.B. McLaughlin.**

Baes, Charles F., 1924-. McLaughlin, Samuel B. Oak Ridge, Tenn. : Environmental Sciences Division, Oak Ridge National Laboratory, 1985 . Caption title.~ "Conf-8505156--3."~ "DE86 011078."~ "Publication 2571.". 14, 5 p. : ill. Bibliography: leaves 12-14. (NAL Call No.: DNAL SB765.B3).

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**Tractor mounted herbicide applicator.**

McLeod, F.E. Dodd, R.B.; Reamer, L.D. Clemson, S.C. : The Department. Forestry bulletin - Dept. of Forestry, Clemson University. Feb 1987. (52). 5 p. ill. (NAL Call No.: DNAL SD144.S6C5).

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**Tragedy of the four notch.**

AMFOA. Miles, B.R. Washington, D.C. : American Forestry Association. American forests. Mar/Apr 1987. v. 93 (3/4). p. 26-29, 76-78. ill. (NAL Call No.: DNAL 99.8 F762).

5168

**Training material for commercial/non-commercial pesticide applicators2Forest pest control.**

Stillwater, Okla. : Cooperative Extension Service, Oklahoma State University, 1987 . Abstract: This packet of material, intended for preparation for certification, includes publications on biology of forest pests, methods of pesticide selection and application, safety, environmental effects, equipment calibration, and pesticide law. Title from portfolio.~ Ken Pinkston, Interim Extension Pesticide Coordinator.~ Includes contents sheet and various materials. 1 portfolio : ill., maps ; 33 cm. (NAL Call No.: DNAL SB950.2.05T72).

5169

**Transplanting stress in bareroot conifer seedlings: its development and progression to establishment.**

Rietveld, W.J. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Sept 1989. v. 6 (3). p. 99-107. ill. Includes references. (NAL Call No.: DNAL SD143.N6).

5170

**Trap trees for control of Dutch elm disease.**

JOARD. Lanier, G.N. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. May 1989. v. 15 (5). p. 105-111. ill. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Trapping western pine beetles with baited toxic trees.**

Smith, R.H. Berkeley, Calif. : The Station. USDA Forest Service research note PSW - United States Pacific Southwest Forest and Range Experiment Station. June 1986. (382). 9 p. Includes references. (NAL Call No.: DNAL A99.9 F7652).

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were transplanted into root observation boxes  
under greenhouse conditions to study timing of  
budbreak, root regeneration, and subsequent  
shoot growth during establishment. Green ash  
seedlings began shoot growth before root  
growth. Seven to 20 days after transplant,  
intact second- and third-order lateral roots  
(referred to here after as intact roots) began  
to elongate, followed 10 to 19 days later by  
initiation of long roots from callus at pruned  
root surfaces. Plants with earlier budbreak  
were larger and regenerated more roots faster  
than plants that broke bud later. During  
establishment, there was a strong correlation  
between shoot and intact root elongation and a  
low correlation between shoot and long root



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elongation. Root pruning after establishment resulted in bud set and/or cessation of shoot elongation within 3 to 6 days in 1985 and within 20 to 28 days in 1986. The days to bud set and cessation of shoot elongation were positively correlated with increased numbers of regenerated roots from pruned surfaces (long roots). Only long root elongation was significantly correlated with shoot growth after root pruning. Root pruning also induced reductions (12 days) in net photosynthesis, transpiration, and stomatal conductance, and increased stomatal resistance to water loss; however, all recovered after root regeneration. *Journal of the American Society for Horticultural Science*. July 1989. v. 114 (4). p. 591-595. Includes references. (NAL Call No.: DNAL 81 SD12).

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FDSCA. Enebak, S.A. Palmer, M.A.; Blanchette, R.A. Bethesda, Md. : Society of American Foresters. In a forest tree nursery dazomet, captan, thiram, captan-thiram combination, or silica sand did not reduce populations of three soilborne fungi. Preemergence mortality was greatest in nontreated plots, (56%) and least in plots treated with dazomet (46%). Nontreated plots had the most post-emergence damping off, (15%) and silica sand the least (3%). *Rhizoctonia solani* (AG-1) was isolated from 52% of damped-off seedlings collected while *Pythium* spp., *Fusarium* spp. and *Cylindrocladium* spp. were recovered from 24%, 23%, and 1% of the seedlings, respectively. Seedling mortality from May 18 to September 23, 1986, ranged from 28% in the dazomet plots to 61% in nontreated plots. At the end of the first growing season, plots treated with dazomet had significantly more seedlings than any other treatment. The incidence of stunted seedlings was greatest in plots treated with dazomet and least when seed was covered with silica sand. Silica sand or thiram treatments produced seedlings with the



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JEENAI. Pasek, J.E. Dix, M.E. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1681-1690. Includes references. (NAL Call No.: DNAL 421 J822).

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Rousseau, J. Reid, C.P.P. Corvallis, Or. : Oregon State University, Forest Research Laboratory, 1985. Proceedings of the 6th North American Conference on Mycorrhizae : June 25-29, 1984, Bend, Oregon / compiled and edited by Randy Molina ; sponsoring institutions, Oregon State University, College of Forestry, and USDA. p. 340. Includes references. (NAL Call No.: DNAL aQK604.N6 1984).

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XGTIA. Vance, N.C. Ogden, Utah : The Station. USDA Forest Service general technical report INT - Intermountain Forest and Range Experiment Station. June 1985. (185). p. 126-128. ill. Includes references. (NAL Call No.: DNAL aSD11.A48).

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Ginn, S.E. Seiler, J.R.; Cazell, B.H.; Kneb, R.E. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 67-73. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**Disturbance and succession in Buxton Woods, Cape Hatteras, North Carolina.**  
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**Evidence of pine growth loss in Forest Service inventory data.**  
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**Growth estimates in natural white pine stands over two decades.**  
GTRWD. Cooke, R.R. Barrett, J.P. Washington, D.C. : The Service. General technical report WO - U.S. Department of Agriculture, Forest Service. Paper presented at a "Symposium on Eastern White Pine: Today and Tomorrow," June 12-14, 1985, Durham, New Hampshire. Apr 1986. (51). p. 46-50. Includes references. (NAL Call No.: DNAL aSD11.U52).

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**Measuring diameter increment change caused by western spruce budworm defoliation in British Columbia.**  
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**Mycosociological studies of mycorrhizal fungi in two loblolly pine plots in Mississippi and some relationships with remote sensing.**  
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**Oak decline and mortality in the southeast: an assessment.**  
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**Sequence of trees attacked by spruce beetles in a mature even-aged spruce stand in south-central Alaska.**  
NOSCA. Hard, J.S. Pullman, Wash. : Washington State University Press. Northwest science : official publication of the Northwest Scientific Association. Feb 1989. v. 63 (1). p. 5-12. Includes references. (NAL Call No.: DNAL 470 N81).

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**Site index curves for Norway spruce in southern Ontario.**  
Gordon, A.M. Williams, P.A.; Taylor, E.P. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Mar 1989. v. 6 (1). p. 23-26. maps. Includes references. (NAL Call No.: DNAL SD143.N6).

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**Spruce budworms handbook shigometry, a reference guide / by Alex L. Shigo and Walter C. Shortle --.**  
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**The spruce-fir resource of Maine.**  
XGNEA. Powell, D.S. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 59-67. ill., maps. Includes references. (NAL Call No.: DNAL aSD11.U56).

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**STEMS model projection capability with incomplete tree list input data.**  
Randall, B.L. Ek, A.R.; Hahn, J.T.; Buchman, R.G. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Sept 1988. v. 5 (3). p. 190-194. Includes references. (NAL Call No.: DNAL SD143.N6).

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**Ten-year risk-rating systems for California red fir and white fir development and use /George T. Ferrell.**  
Ferrell, George T. Berkeley, Calif. : U.S. Dept. of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station, 1989? . Cover title.~ "July 1989"--P. 2 of cover. 12 p. : ill. ; 22 cm. Includes bibliographical references (p. 12). (NAL Call No.: DNAL aSD11.A325 no.115).

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**Three-dimensional forest growth model relating tree size, tree number, and stand age: relation to previous growth models and to self-thinning.**  
FOSCA. McFadden, G. Oliver, C.D. Bethesda, Md. : Society of American Foresters. A generalized three-dimensional model for tree growth containing tree size, number of trees per area, and stand age on the three axes can be shown to incorporate three previous models in the theoretical absence of differentiation and self-thinning. The previous models, each incorporating two of the three axes, are: the sigmoid growth models of tree size/stand age; the relation of tree size (volume or diameter)/tree number; and the reverse-J-shaped mortality relation of maximum tree number/stand age. Information developed from one two-dimensional model can be transferred to the other models using the three-dimensional response surface to interpret the growth trajectory of stands undergoing differentiation and self-thinning. For. Sci. 34(3):662-676. Forest science. Sept 1988. p. 662-676. Includes references. (NAL Call No.: DNAL 99.8 F7632).

5621

**Three-dimensional representation of Douglas-fir volume growth: comparison of growth and yield models with stand data.**  
FOSCA. O'Hara, K.L. Oliver, C.D. Bethesda, Md. : Society of American Foresters. Growth and yield estimates for unthinned stands from the Douglas-fir Stand Simulator (DFSIM; Curtis et al. 1981) and the Tree and Stand Simulator (TASS; Mitchell and Cameron 1985) were used to construct graphical three-dimensional representations of Douglas-fir (*Pseudotsuga menziesii* Mirb. Franco) stand growth on site index 44 meter (50 year). The three-dimensional models used three variables: trees per hectare, breast height age, and either mean tree volume

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or stand volume. The TASS and DFSIM models were in agreement over most of their common range of age and number of trees. At wider spacings and older ages, however, the volumes predicted by the DFSIM model exceeded those predicted by the TASS model by as much as 25%. Comparisons of these three-dimensional models to unthinned and thinned stand data from a similar site quality found the models to be reasonably accurate representations of unthinned stand growth. The thinned stands, however, had greater mean tree and stand volumes than those indicated by the TASS model for unthinned stands at similar spacings. Complete comparisons were not possible with the DFSIM model because of its limited range of number of trees. These results suggest the TASS model, and to a lesser extent, the DFSIM model may be underestimating the growth of widely spaced stands, or thinning may actually increase the growth of thinned trees over that of trees which had always grown at the post-thinning spacing. For. Sci. 34(3):724-743. Forest science. Sept 1988. p. 724-743. Includes references. (NAL Call No.: DNAL 99.8 F7632).



# FOREST PRODUCTS - GENERAL

5622

**Comparative effects of an insect growth regulator, S-31183, against the Formosan subterranean termite and eastern subterranean termite (Isoptera: Rhinotermitidae).**  
JEENAI. Su, N.Y. Scheffrahn, R.H. Lanham, Md. : Entomological Society of America. In a no-choice experiment, the insect growth regulator 2-1-methyl-2(4-phenoxyphenoxy)ethoxy pyridine (S-31183) induced presoldier formation more effectively in the eastern subterranean termite, *Reticulitermes flavipes* (Kollar) than in the Formosan subterranean termite, *Coptotermes formosanus* Shiraki. When given a choice of treated or untreated wood cubes, *C. formosanus* avoided feeding on cubes treated with concentrations of 1,500 and 7,500 ppm. A S-31183 concentration of 300 ppm (AI) did not deter feeding or increase presoldier formation in *C. formosanus*. Feeding of *R. flavipes* groups exposed to cubes containing 30 or 150 ppm S-31183 was not deterred, but these concentrations caused approximately 80% worker mortality by the end of the 12-wk test. The results indicate that S-31183 might control *R. flavipes* colonies if 30-150 ppm were applied to a bait. *Journal of economic entomology*. Aug 1989. v. 82 (4). p. 1125-1129. Includes references. (NAL Call No.: DNAL 421 J822).

5623

**Concentration-dependent presoldier induction and feeding deterrence: potential of two insect growth regulators for remedial control of the Formosan subterranean termite (Isoptera: Rhinotermitidae).**  
JEENAI. Haverty, M.I. Su, N.Y.; Tamashiro, M.; Yamamoto, R. Lanham, Md. : Entomological Society of America. Laboratory experimental groups of 120 workers and 30 soldiers of *Coptotermes formosanus* Shiraki were given a choice of feeding on untreated pine blocks or pine blocks treated with one of five concentrations of methoprene (0, 4, 20, 100, and 500 ppm) or S-31183 (2-1-methyl-2(4-phenoxy-phenoxy)ethoxy pyridine) (0, 20, 100, 500, and 2,500 ppm) for 4, 8, or 12 wk. Soldier production and total mortality were significantly increased by 100 and 500 ppm methoprene at 8 and 12 wk. Biologically significant mortality (>50%) resulted from feeding on blocks treated with methoprene at 500 ppm after 8 wk. The response of *C. formosanus* to S-31183 was much reduced when compared with the response to methoprene. None of the concentrations of S-31183 caused biologically significant mortality to the *C. formosanus* groups. In addition, the highest concentration of S-31183 caused feeding deterrence that was apparently learned. Effective baits for remedial control of *C. formosanus* colonies should be evaluated under conditions that simulate actual use. These baits would require methoprene concentrations from 500 to 1,500 ppm, depending on the pattern of use. *Journal of economic entomology*. Oct 1989. v. 82 (5). p. 1370-1374. Includes references. (NAL Call No.: DNAL 421 J822).

5624

**Entomogenous nematodes for control of subterranean termites, *Reticulitermes* spp. (Isoptera: Rhinotermitidae).**  
JEENAI. Mauldin, J.K. Beal, R.H. Lanham, Md. : Entomological Society of America. Laboratory and field studies were done to determine the efficacy of entomogenous nematodes in preventing or eliminating eastern subterranean termites, *Reticulitermes flavipes* (Kollar), in the laboratory and infestations of *Reticulitermes* spp. in the field. Nematodes tested in a laboratory study were two strains (Breton and All) of *Steinernema feltiae* Filipjev (= *Neoaplectana carpocapsae* Weiser), *S. bibionis* (Bovien), and *Heterorhabditis heliothidis* (Khan, Brooks, and Hirschmann). The same nematodes were tested in field studies except that the Mexican strain of *S. feltiae* was used instead of the Breton strain. In the laboratory study, termites quickly moved from a nest container through a tube containing a mixture of sand, vermiculite, and water to reach a chamber in which nematodes had been released. After 9.5 wk, termite survival rates in the nematode treatments and in the untreated control did not differ significantly. In field studies, nematodes did not eliminate or control termites either in a simulation of soil treatments under concrete slabs or in logs naturally infested with termites. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1638-1642. ill. Includes references. (NAL Call No.: DNAL 421 J822).

5625

**Preference of the Formosan subterranean termite (Isoptera: Rhinotermitidae) for wood damaged by conspecifics.**  
JEENAI. Delaplane, K.S. La Fage, J.P. Lanham, Md. : Entomological Society of America. In a laboratory choice-feeding test, groups of termites from five colonies of *Coptotermes formosanus* Shiraki were presented with wood blocks that had been previously damaged by nestmates; by conspecifics from another colony; by another termite species, *Reticulitermes virginicus* (Banks); and that had no damage. *C. formosanus* preferred wood previously damaged by conspecifics, regardless of colony origin, over wood damaged by *R. virginicus* or undamaged wood. Additionally, they preferred wood damaged by *R. virginicus* over undamaged wood. Covariate analyses and trail-following assays suggested that the results were almost entirely explained by thigmotactic cues on the surface of damaged wood blocks rather than on pheromonal cues deposited on the wood. *Journal of economic entomology*. Oct 1989. v. 82 (5). p. 1363-1366. Includes references. (NAL Call No.: DNAL 421 J822).

5626

Retention time and toxicity of a dye marker, Sudan red 7B, on Formosan and eastern subterranean termites (Isoptera: Rhinotermitidae).

JESCEP. Su, N.Y. Scheffrahn, R.H.; Ban, P. Tifton, Ga. : The Entomological Science Society. Journal of entomological science. July 1988. v. 23 (3). p. 235-239. Includes references. (NAL Call No.: DNAL QL461.G4).

5627

Toxicity and feeding deterrence of a dihaloalkyl arylsulfone biocide, A-9248, against the Formosan subterranean termite (Isoptera: Rhinotermitidae).

JEENAI. Su, N.Y. Scheffrahn, R.H. College Park, Md. : Entomological Society of America.

Abstract: The topical LD50 of A-9248 (diiodomethyl para-tolyl sulfone) against the Formosan subterranean termite, *Coptotermes formosanus* Shiraki, was estimated at 141.7 ug/g with 95% fiducial limits of 110.4-168.3 ug/g. A-9248 showed protracted activity against this termite. Time required to kill 90% of *C. formosanus* (ELT90) was 8.4-18.9 d when administered topically, 21-26 d after 24-h forced feeding, and 19-22 d when *C. formosanus* were confined continuously on treated feeding substrate. Results of a choice test revealed that A-9248 is a feeding deterrent at concentrations greater than or equal to 8,000 ppm. Initially, *C. formosanus* fed on wood treated with 1,000-6,000 ppm A-9248 but learned to avoid the treatment of A-9248. Only those groups exposed to wood treated with less than 1,000 ppm continued feeding on the treated substrate; ingestion of these concentrations resulted in 85-100% mortality at the end of the 4 wk experiment. Journal of economic entomology. June 1988. v. 81 (3). p. 850-854. Includes references. (NAL Call No.: DNAL 421 J822).

5628

Using wood preservatives safely U.S. Environmental Protection Agency ; prepared by Mediatek, Inc.

Tacoma, WA : Mediatek, 1986? . Pesticide application training collection. 206 slides : col. + 1 sound cassette (30 min. : mono, 7 1/2 ips) + 1 presentation manual. (NAL Call No.: DNAL Slide no.207).



# FOREST PRODUCTS - WOOD

5629

**Allowable compressive design stresses for pressure-treated round timber foundation piling.**

PAWPA. Graham, J.S. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 50-59. Includes references. (NAL Call No.: DNAL 300.9 AM3).

5630

**Ambrodiscus, a new genus of inoperculate Discomycetes from ambrosia beetle galleries.**  
MYCOAE. Carpenter, S.E. Bronx, N.Y. : The New York Botanical Garden. Mycologia. May/June 1988. v. 80 (3). p. 320-323. ill. Includes references. (NAL Call No.: DNAL 450 M99).

5631

**Ammonium bifluoride treatment of air-seasoning Douglas-fir poles.**

FPJDA. Morrell, J.J. Graham, R.D.; Corden, M.E.; Sexton, C.M.; Kropp, B.R. Madison, Wis. : Forest Products Research Society. In the Pacific Northwest, freshly peeled Douglas-fir poles are often air-seasoned for 6 to 24 months before preservative treatment. During this period, the wood is susceptible to colonization by decay fungi. Although these fungi have little effect on wood properties over the first 2 years, their presence places added importance on adequate sterilization during treatment. The ability of ammonium bifluoride (ABF) to limit fungal colonization was evaluated by flooding pole sections with saturated solutions of ABF before air-seasoning them for 1, 2, or 3 years at sites in Oroville, Calif.; Eugene, Oreg.; Scappoose, Oreg.; and Arlington, Wash. Each year, selected poles were destructively sampled to determine levels of fungal colonization. The results indicate that ABF substantially reduced those levels, especially at the drier, southernmost site. ABF treatment can reduce, but not eliminate, the risk of fungal colonization during air-seasoning. Forest products journal. Jan 1989. v. 39 (1). p. 51-54. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5632

**Anatomical studies of CCA penetration associated with conventional (tooth) and with micro (needle) incising.**

WOODFAJ. Keith, C.T. Chauret, G. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Apr 1988. v. 20 (2). p. 197-208. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5633

**Antitermitic and antifungal properties of selected bark extractives.**

WOODFAJ. Harun, J. Labosky, P. Jr. Madison : Society of Wood Science and Technology. Wood and fiber science. July 1985. v. 17 (3). p. 327-335. Includes references. (NAL Call No.: DNAL TA419.W6).

5634

**Attempts to improve penetration of waterborne preservatives in spruce and jack pine lumber.**  
FPJDA. Keith, C.T. Madison, Wis. : Forest Products Research Society. Forest products journal. Nov/Dec 1985. v. 35 (11/12). p. 59-64. ill. Includes 15 references. (NAL Call No.: DNAL 99.9 F7662J).

5635

**Azaconazole, a new wood preservative.**

PAWPA. Valcke, A.R. Goodwine, W.R. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 196-202. Includes references. (NAL Call No.: DNAL 300.9 AM3).

5636

**Bait stake detection of the Formosan termite in south Florida.**

FETMA. Thompson, C.R. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1985. v. 68 (4). p. 641-645. ill. Includes references. (NAL Call No.: DNAL 420 F662).

5637

**Bioassaying wood preservatives with Aspergillus niger.**

WOODFAJ. Morrell, J.J. Madison : Society of Wood Science and Technology. Wood and fiber science. Oct 1987. v. 19 (4). p. 388-391. Includes references. (NAL Call No.: DNAL TA419.W6).

5638

**Biodegradation of Pentachlorophenol by the white rot fungus Phanerochaete chrysosporium.**

APMBA. Mileski, G.J. Bumpus, J.A.; Jurek, M.A.; Aust, S.D. Washington, D.C. : American Society for Microbiology. Extensive biodegradation of pentachlorophenol (PCP) by the white rot fungus Phanerochaete chrysosporium was demonstrated by the disappearance and mineralization of <sup>14</sup>C PCP in nutrient nitrogen-limited culture. Mass balance analyses demonstrated the formation of water-soluble metabolites of <sup>14</sup>C PCP during degradation. Involvement of the lignin-degrading system of this fungus was

suggested by the fact that the time of onset, time course, and eventual decline in the rate of PCP mineralization were similar to those observed for <sup>14</sup>C lignin degradation. Also, a purified ligninase was shown to be able to catalyze the initial oxidation of PCP. Although biodegradation of PCP was decreased in nutrient nitrogen-sufficient (i.e., nonligninolytic) cultures of *P. chrysosporium*, substantial biodegradation of PCP did occur, suggesting that in addition to the lignin-degrading system, another degradation system may also be responsible for some of the PCP degradation observed. Toxicity studies showed that PCP concentrations above 4 mg/liter (15 microM) prevented growth when fungal cultures were initiated by inoculation with spores. The lethal effects of PCP could, however, be circumvented by allowing the fungus to establish a mycelial mat before adding PCP. With this procedure, the fungus was able to grow and mineralize <sup>14</sup>C PCP at concentrations as high as 500 mg/liter (1.9 mM). Applied and environmental microbiology. Dec 1988. v. 54 (12). p. 2885-2889. Includes references. (NAL Call No.: DNAL 448.3 AP5).

5639

**Biological control of decay fungi in wood.**  
Mercer, P.C. Boca Raton, Fla. : CRC Press, 1988. Biocontrol of plant diseases / editors, K.G. Mukerji, K.L. Garg. Literature review. v. 1 p. 177-198. ill. Includes references. (NAL Call No.: DNAL SB732.6.B56).

5640

**Bionomics of *Lomamyia hamata* (Neuroptera: Berothidae).**  
AESAAI. Brushwein, J.R. College Park, Md. : The Society. Annals of the Entomological Society of America. Sept 1987. v. 80 (5). p. 671-679. ill. Includes references. (NAL Call No.: DNAL 420 EN82).

5641

**Borate rods as an on-site remedial treatment for control of decay in wood decks.**  
JMNA. Dietz, M.G. Schmidt, E.L. St. Paul, Minn. : The Academy. Journal of the Minnesota Academy of Science. Winter 1988. v. 53 (2). p. 22-26. ill. Includes references. (NAL Call No.: DNAL 500 M663).

5642

**Boron treatment of hardwood lumber: a preliminary cost analysis.**  
FPJQA. Mulach, R.W. Cabbage, F.W.; Granskog, J.E. Madison, Wis. : Forest Products Research Society. Boron was examined as an alternative to lindane for treatment of hardwood lumber. Costs were calculated for systems representative of current practice and for

systems most likely for boron usage. The application methods for current lindane-based chemicals and those required for boron differ, as do the end results. Boron treatment provides more thorough wood penetration, which results in better long-term protection of manufactured products. A comparison of costs showed boron was more expensive per unit treated than current systems with lindane, but annual costs could be reduced by selective application of boron with new bulk dip equipment. Forest products journal. July/Aug 1989. v. 39 (7/8). p. 49-52. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5643

**Bound chlorinated residue in chloropicrin-treated Douglas-fir.**  
WOODFAJ. Goodell, B.S. Krahmer, R.L.; Graham, R.D. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1986. v. 18 (1). p. 127-133. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5644

**Burning cacodylic acid-treated oak trees: how safe?**  
FPJQA. Woolson, E.A. Madison, Wis. : Forest Products Research Society. Forest products journal. May 1986. v. 36 (5). p. 49-52. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5645

**A case for ecosystem-level experimentation in termite research.**  
SOCID. French, J.R.U. Chico, Calif. : California State University, Dept. of Biological Sciences. Sociobiology. Paper presented at the "Symposium on Recent Developments in Termite Biology," December 2, 1987, Boston, Massachusetts. 1988. 14 (1). p. 269-280. Includes references. (NAL Call No.: DNAL QH549.S6).

5646

**CCA-PEG pole preservative research.**  
PAWPA. Trumble, W.P. Messina, E.E. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 203-212. (NAL Call No.: DNAL 300.9 AM3).



5647

**Changes in structural and chemical components of wood delignified by fungi.**

WOSTBE. Blanchette, R.A. Otjen, L.; Effland, M.J.; Eslyn, W.E. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1985. v. 19 (1). p. 35-46. ill. Includes references. (NAL Call No.: DNAL SD433.A1W6).

5648

**Characteristics of decay and insect attack in California homes.**

CAGRA. Brier, A.N. Dost, W.A.; Wilcox, W.W. Berkeley, Calif. : The Station. California agriculture - California Agricultural Experiment Station. Sept/Oct 1988. v. 42 (5). p. 21-22. Includes references. (NAL Call No.: DNAL 100 C12CAG).

5649

**Characteristics of wound-associated wood of yellow-poplar (*Liriodendron tulipifera* L.).**

WOODFAU. Lowerts, G. Wheeler, E.A.; Kellison, R.C. Madison : Society of Wood Science and Technology. Wood and fiber science. Oct 1986. v. 18 (4). p. 537-552. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5650

**A chemical and microscopic study of decayed earlywood and latewood of loblolly pine killed by the southern pine beetle.**

WOODFAU. Shamoun, S.F. Levi, M.P. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1985. v. 17 (1). p. 22-28. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5651

**Chloromethane, a novel methyl donor for biosynthesis of esters and anisoles in *Phellinus pomaceus*.**

APMBA. Harper, D.B. Hamilton, J.T.G.; Kennedy, J.T.; McNally, K.J. Washington, D.C. : American Society for Microbiology. Chloromethane (CH<sub>3</sub>Cl), a gaseous natural product released as a secondary metabolite by many wood-rotting fungi of the family Hymenochaetaceae, has been shown to act as a methyl donor for biosynthesis of methyl esters of benzoic and furoic acid in the primary metabolism of *Phellinus pomaceus*. The broad-specificity methylating system could esterify a wide range of aromatic and aliphatic acids. In addition to CH<sub>3</sub>Cl, both bromo- and iodomethanes acted as methyl donors. Methylation did not appear to proceed via methanol or a coenzyme A intermediate. The initial growth-related accumulation of methyl benzoate during culture of *P. pomaceus* was paralleled by an increase in activity of the

methylating system in the mycelium. Changes in percent incorporation of C<sup>14</sup>H<sub>3</sub> from exogenous C<sup>14</sup>H<sub>3</sub>Cl during growth indicated that although utilization of CH<sub>3</sub>Cl was initially closely coupled to biosynthesis of the compound, the system became less channeled later in growth. This phase coincide with release of gaseous CH<sub>3</sub>Cl by the fungus. A biochemically distinct CH<sub>3</sub>Cl-utilizing system capable of methylating phenols and thiophenol was also identified in the fungus, but in contrast with the carboxylic acid-methylating systems, it attained maximum activity in the idiophase. Preliminary investigations of a non-CH<sub>3</sub>Cl-releasing fungus, *Fomitopsis pinicola*, have shown the presence of a CH<sub>3</sub>Cl-utilizing system capable of methylating benzoic acid suggesting that CH<sub>3</sub>Cl biosynthesis may occur in non-hy menochaetaceous fungi. Halogenated compounds hitherto found in nature are mainly stable end products of metabolism. The participation of CH<sub>3</sub>Cl in primary fungal metabolism demonstrates that some halometabolites may have a previously unrecognized role as intermediates in the biosynthesis of nonhalogenated natural products. Applied and environmental microbiology. Aug 1989. v. 55 (8). p. 1981-1989. Includes references. (NAL Call No.: DNAL 448.3 AP5).

5652

**Comparative wood consumption within and between mounds of *Coptotermes acinaciformis* (Froggatt) (Isoptera: Rhinotermitidae).**

SOCID. Creffield, J.W. Howick, C.D.; Pahl, P.J. Chico, Calif. : California State University, Dept. of Biological Sciences. Sociobiology. 1985. v. 11 (1). p. 77-86. Includes references. (NAL Call No.: DNAL QH549.S6).

5653

**Comparing the efficacies of water-emulsifiable formulations of pentachlorophenol with that of technical-grade penta by soil-block bioassays.**

PAWPA. Amburgey, T.L. Fatima Castro Cardias, M. de; Parikh, S.V. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 10-18. Includes references. (NAL Call No.: DNAL 300.9 AM3).

5654

**A comparison of needle incising and conventional North American incising processes for improving preservative treatment.**

PAWPA. Ruddick, J.N.R. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 148-160. ill. Includes references. (NAL Call No.: DNAL 300.9 AM3).

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**Comparison of wood preservatives in stake tests (1985 progress report).**

XALNA. Gjovik, L.R. Gutzmer, D.I. Madison : The Laboratory. USDA Forest Service research note FPL - United States, Forest Products Laboratory. Includes statistical data. May 1986. (O254). 100 p. (NAL Call No.: DNAL A99.9 F7634UN).

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**Comparisons of pentachlorophenol formulations in soil-block tests.**

WOODFAJ. DeGroot, R.C. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Apr 1988. v. 20 (2). p. 209-214. Includes references. (NAL Call No.: DNAL TA419.W6).

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**The condo eaters.**

BISNA. Hardy, T. Washington, D.C. : The Institute. BioScience - American Institute of Biological Sciences. Nov 1988. v. 38 (10). p. 662-664. ill. (NAL Call No.: DNAL 500 AM322A).

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**Control of decay in above-water marine pilings.**

Washington, D.C. : The Service. Engineering field notes - United States Forest Service, Engineering Staff. Mar/Apr 1988. v. (20). p. 43-44. ill. (NAL Call No.: DNAL aSD388.A1U52).

5659

**Control of mold and stain on methyl bromide fumigated red oak sapwood.**

FPJDA. Schmidt, E.L. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1985. v. 35 (2). p. 61-62. Includes 10 references. (NAL Call No.: DNAL 99.9 F7662U).

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**Controlling decay fungi colonizing air-seasoned Douglas-fir heartwood with high temperature exposures.**

Morrell, J.J. Corden, M.E.; Newbill, M.A.; Przybylowicz, P. Corvallis, Or. : Western Dry Kiln Clubs. Proceedings ... annual meeting - Western Dry Kiln Clubs. May 8, 1985. p. 90-96. Includes references. (NAL Call No.: DNAL 99.9 W5233).

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**Controlling wood deterioration with fumigants: a review.**

FPJDA. Morrell, J.J. Corden, M.E. Madison, Wis. : Forest Products Research Society. Forest products journal. Literature review. Oct 1986. v. 36 (10). p. 27-34. Includes references. (NAL Call No.: DNAL 99.9 F7662U).

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**Cooperative Marine Piling Project: joint Navy-industry inspection of marine piles--report III.**

PAWPA. Bultman, J.D. Webb, D.A. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 165-168. ill. Includes references. (NAL Call No.: DNAL 300.9 AM3).

5663

**Crustoderma longicystidia associated with decay of lumber in British Columbia, and the cultural features of C. dryina.**

MYCOAE. Ginns, J. Clark, J. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Nov/Dec 1989. v. 81 (6). p. 921-926. ill. Includes references. (NAL Call No.: DNAL 450 M99).

5664

**Current status of the Formosan subterranean termite in Florida.**

Su, N.Y. Scheffrahn, R.H. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii.~ Literature review. Oct 1987. (O83). p. 27-31. maps. Includes references. (NAL Call No.: DNAL S481.R4).

5665

**Decomposition of methylisothiocyanate in Douglas-fir heartwood.**

FPJDA. Zahora, A.R. Morrell, J.J. Madison, Wis. : Forest Products Research Society. Decomposition of the wood fumigant methylisothiocyanate (MIT) was studied in blocks of Douglas-fir heartwood. Decomposition was influenced by wood moisture content (MC), with decomposition rates estimated at 0.2, 0.9, and 1.6 percent per week of the total bound MIT for wood fumigated at 0, 12, and 60 percent MC, respectively. Dimethylthiourea and 2,4-dimethyl-1,2,4-thiadiazolidine-3,5-dithione, which formed during fumigation, showed toxic activity against the decay fungus



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*Poria carbonica*. Elemental sulfur was also formed, but showed minimal fungitoxic activity. Some MIT remained in fumigated wood even after extensive aeration under dry conditions. This residual MIT rapidly volatilized at fungitoxic concentrations when wood was wetted and may provide residual protection against fungal invasion. *Forest products journal*. Oct 1988. v. 38 (10). p. 46-52. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Decreasing losses due to wood deterioration through proper forestry practices.**  
Amburgey, T.L. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 105-110. Includes references. (NAL Call No.: DNAL 99.9 L935).

5667

**Detection of fungal degradation at low weight loss by differential scanning calorimetry.**  
WOOF AJ. Baldwin, R.C. Streisel, R.C. Madison : Society of Wood Science and Technology. Wood and fiber science. July 1985. v. 17 (3). p. 315-326. Includes references. (NAL Call No.: DNAL TA419.W6).

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**Diffusion and sorption of the fumigant methylisothiocyanate in Douglas-fir wood.**  
WOOF AJ. Zahora, A.R. Morrell, J.J. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Jan 1989. v. 21 (1). p. 55-66. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5669

**Durability of preservative-treated wood utility poles in Guam.**  
XAFLA7. DeGroot, R.C. Lauret, T.H. Madison, Wis. : The Laboratory. Research paper FPL - United States Department of Agriculture, Forest Service, Forest Products Laboratory. May 1986. (472). 17 p. ill., maps. Includes references. (NAL Call No.: DNAL A99.9 F7634U).

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**Effect of *Coriolus versicolor* on physico-chemical properties of *Eucalyptus globulus* wood.**  
WOSTBE. Bhandari, K.S. Bist, V. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1989. v. 23 (2). p. 163-169. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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**Effect of fluorescent-labeled lectins on visualization of decay fungi in wood sections.**  
PHYTAU. Morrell, J.J. Gibson, D.G.; Krahmer, R.L. St. Paul, Minn. : American Phytopathological Society. *Phytopathology*. Mar 1985. v. 75 (3). p. 329-332. ill. Includes 11 references. (NAL Call No.: DNAL 464.8 P56).

5672

**The effect of light stabilizers on the iron and water degradation of wood.**  
PAWPA. Hussey, B.E. Nicholas D.D. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 169-173. ill. Includes references. (NAL Call No.: DNAL 300.9 AM3).

5673

**The effect of pH on decomposition of Mylone (dazomet) and tridipam to fungitoxic methylisothiocyanate in wood.**  
WOOF AJ. Morrell, J.J. Sexton, C.M.; Lebow, S. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1988. v. 20 (4). p. 422-430. Includes references. (NAL Call No.: DNAL TA419.W6).

5674

**Effect of sludge on wood properties: a conceptual review with results from a sixty-year-old Douglas-fir stand.**  
Briggs, D.G. Mecific, F.; Smith, W.R. Seattle : University of Washington Press, 1986. The Forest alternative for treatment and utilization of municipal and industrial wastes / edited by Dale W. Cole, Charles L. Henry, and Wade L. Nutter. p. 246-257. Includes references. (NAL Call No.: DNAL TD897.F65).

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**Effect of volume and position of stakes on feeding by subterranean termites (Isoptera).**  
SOCID. Shahid, A.S. Akhtar, M.S. Chico, Calif. : California State University, Department of Biological Sciences. *Sociobiology*. 1989. v. 16 (2). p. 99-108. ill. Includes references. (NAL Call No.: DNAL QH549.S6).

5676

**The effect of wetwood on lumber drying times and rates: an exploratory evaluation with longitudinal gas permeability.**  
WOOF AJ. Ward, J.C. Madison : Society of Wood Science and Technology. Wood and fiber science. Literature review. Apr 1986. v. 18 (2). p.

288-307. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5677

**Effectiveness of ammoniacal copper zinc arsenate wood preservative as indicated by a soil-block analysis.**

FPJDA. Wilcox, W.W. Madison, Wis. : Forest Products Research Society. Forest products journal. July/Aug 1987. v. 37 (7/8). p. 62-63. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5678

**Effects of heartwood inhabiting fungi on thujaplicin content and decay resistance of western redcedar (*Thuja plicata* Donn.).**

WOODFAJ. Kamp, B.J. van der. Madison : Society of Wood Science and Technology. Wood and fiber science. July 1986. v. 18 (3). p. 421-427. Includes references. (NAL Call No.: DNAL TA419.W6).

5679

**Effects of pH on lignin and cellulose degradation by *Streptomyces viridosporus*.**

APMBA. Pometto, A.L. III. Crawford, D.L. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. Aug 1986. v. 52 (2). p. 246-250. Includes 21 references. (NAL Call No.: DNAL 448.3 AP5).

5680

**Effects of soldier proportion on the wood-consumption rate of the formosan subterranean termite (*Isoptera*: *Rhinotermitidae*).**

SOCID. Su, N.Y. La Fage, J.P. Chico, Calif. : California State University, Dept. of Biological Sciences. Sociobiology. 1987. v. 13 (2). p. 145-151. Includes references. (NAL Call No.: DNAL QH549.S6).

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**Efficacy of alternative preservatives used in dip treatments for wood boxes.**

XAFLA7. DeGroot, R.C. Stroukoff, M. Madison, Wis. : The Laboratory. Research paper FPL-RP - United States Department of Agriculture, Forest Service, Forest Products Laboratory. Nov 1986. (481). 21 p. Includes references. (NAL Call No.: DNAL A99.9 F7634U).

5682

**Efficacy of various fumigants in the eradication of decay fungi implanted in Douglas-fir timbers.**

PHYTAJ. Eslyn, W.E. Highley, T.L. St. Paul, Minn. : American Phytopathological Society. Phytopathology. May 1985. v. 75 (5). p. 588-592. ill. Includes 13 references. (NAL Call No.: DNAL 464.8 P56).

5683

**Electron-dense particles in wood decayed by *Ganoderma applanatum*.**

WOSTBE. Murmanis, L. Palmer, J.G.; Highley, T.L. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1985. v. 19 (4). p. 313-321. ill. Includes references. (NAL Call No.: DNAL SD433.A1W6).

5684

**Evaluating potential decay control agents with a small block test.**

WOODFAJ. Corden, M.E. Morrell, J.J. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1988. v. 20 (4). p. 477-486. Includes references. (NAL Call No.: DNAL TA419.W6).

5685

**Evaluation of encapsulated and gelled chloropicrin formulations for use in wood poles.**

WOODFAJ. Goodell, B.S. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Jan 1989. v. 21 (1). p. 37-44. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5686

**Experiments on the effect of ultrasonic energy on the absorption of preservatives by wood.**

WOODFAJ. Avramidis, S. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. July 1988. v. 20 (3). p. 397-403. Includes references. (NAL Call No.: DNAL TA419.W6).

5687

**Field comparison of sulfuryl fluoride susceptibility among three termite species (*Isoptera*: *Kalotermitidae*, *Rhinotermitidae*) during structural fumigation.**

JEENAI. Su, N.Y. Scheffrahn, R.H. College Park, Md. : Entomological Society of America. Journal of economic entomology. Aug 1986. v. 79 (4). p. 903-908. ill. Includes references. (NAL Call No.: DNAL 421 J822).



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5688

**Field evaluation of responses of *Gnathotrichus sulcatus* and *G. retusus* (Coleoptera: Scolytidae) to semiochemicals.**  
JEENAI. Liu, Y.B. McLean, J.A. Lanham, Md. : Entomological Society of America. *Gnathotrichus sulcatus* LeConte and *G. retusus* LeConte of both sexes responded significantly to ethanol or their own aggregation pheromones, (+/-)-sulcatol and (+/-)-sulcatol, respectively. Ethanol was a synergist of (+)-sulcatol for both sexes of *G. retusus*. alpha-Pinene was neither a primary host attractant nor a synergist of the aggregation pheromones. A 1.5 mg/d release rate of (+/-)-sulcatol seems to be optimal for trapping *G. sulcatus*. *Journal of economic entomology*. Dec 1989. v. 82 (6). p. 1687-1690. Includes references. (NAL Call No.: DNAL 421 J822).

5689

**Flame-retardant treatment of wood with a diisocyanate and an oligomer phosphonate.**  
WOOFUJ. Ellis, W.D. Rowell, R.M. Madison, Wis. : The Society. *Wood and fiber science : journal of the Society of Wood Science and Technology*. Oct 1989. v. 21 (4). p. 367-375. Includes references. (NAL Call No.: DNAL TA419.W6).

5690

**The Formosan subterranean termite in Hawaii: problems and control.**  
Tamashiro, M. Yates, J.R.; Ebesu, R.H. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: *Biology and control of the Formosan subterranean termite* / edited by M. Tamashiro and N.Y. Su. *Proceedings of an International Symposium*, June 1985, Honolulu, Hawaii. ~ Literature review. Oct 1987. (083). p. 15-22. maps. Includes references. (NAL Call No.: DNAL S481.R4).

5691

**Fumigants control decay in timbers.**  
Washington, D.C. : The Service. Engineering field notes - United States Forest Service, Engineering Staff. Mar/Apr 1988. v. (20). p. 41-42. ill. (NAL Call No.: DNAL aSD388.A1U52).

5692

**Fungal and termite resistance of wood reacted with periodic acid or sodium periodate.**  
WOOFUJ. Chen, G.C. Rowell, R.M. Madison, Wis. : The Society. *Wood and fiber science : journal of the Society of Wood Science and Technology*. Apr 1989. v. 21 (2). p. 163-168. Includes references. (NAL Call No.: DNAL TA419.W6).

5693

**Fungal colonization of preservative-treated Douglas-fir poles during storage.**  
FPJUA. Morrell, J.J. Newbill, M.A.; Sexton, C.M.; Zahora, A.R. Madison, Wis. : Forest Products Research Society. *Forest products journal*. Jan 1988. v. 38 (1). p. 21-22. (NAL Call No.: DNAL 99.9 F7662J).

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**Fungi colonizing redwood in cooling towers: identities and effects on wood properties.**  
WOOFUJ. Morrell, J.J. Smith, S.M. Madison, Wis. : The Society. *Wood and fiber science : journal of the Society of Wood Science and Technology*. Apr 1988. v. 20 (2). p. 243-249. Includes references. (NAL Call No.: DNAL TA419.W6).

5695

**Fused borate and bifluoride remedial treatments for controlling decay in window millwork.**  
FPJUA. Dietz, M.G. Schmidt, E.L. Madison, Wis. : Forest Products Research Society. *Forest products journal*. May 1988. v. 38 (5). p. 9-14. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5696

**Gelatin encapsulation of methylisothiocyanate for control of wood-decay fungi.**  
FPJUA. Zahora, A.R. Corden, M.E. Madison, Wis. : Forest Products Research Society. *Forest products journal*. July/Aug 1985. v. 35 (7/8). p. 64-69. ill. Includes 14 references. (NAL Call No.: DNAL 99.9 F7662J).

5697

**Green lumber.**  
Pugel, A.D. Urbana, Ill. : The Service. *Illinois forest management : a quarterly newsletter for Illinois landowners* - Department of Forestry and the Cooperative Extension Service, University of Illinois at Urbana-Champaign. Summer/Fall 1987. (13). p. 12-13. (NAL Call No.: DNAL SD144.I3I55).

5698

**Host selection in subterranean termites: factors affecting choice (Isoptera: Rhinotermitidae).**  
SOCID. Waller, D.A. Chico, Calif. : California State University, Dept. of Biological Sciences. *Sociobiology*. Paper presented at the "Symposium on Recent Developments in Termite Biology," December 2, 1987, Boston, Massachusetts. 1988. 14 (1). p. 5-13. Includes references. (NAL Call No.: DNAL QH549.S6).

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**How a tree grows.**

Blacksburg, Va. : Extension Division, Virginia Polytechnic Institute and State University. Publication - Virginia Cooperative Extension Service. 1988. (420-186). 1 p. ill. (NAL Call No.: DNAL S544.3.V8V52).

5700

**Influence of post-felling treatment of birch logs on emergence success of bronze birch borer, *Agilus anxius*, adults (Coleoptera: Buprestidae).**

GENSAB. Akers, R.C. Nielsen, D.G. Tifton, Ga. : The Society. Journal of Entomological Science. Jan 1986. v. 21 (1). p. 63-67. Includes references. (NAL Call No.: DNAL QL461.G4).

5701

**Influence of veratryl alcohol and hydrogen peroxide on ligninase activity and ligninase production by *Phanerochaete chrysosporium*.**

APMBA. Tonon, F. Odier, E. Washington, D.C. : American Society for Microbiology. Abstract: Veratryl alcohol, added as a supplement to cultures of *Phanerochaete chrysosporium*, enhanced ligninase activity through protection of the ligninase against inactivation by hydrogen peroxide produced by this fungus in cultures. In the presence of veratryl alcohol, the loss of ligninase activity observed in non-protein-synthesizing cultures (cycloheximide-treated) equaled the extracellular protein turnover. When cultures were not supplemented with veratryl alcohol, inactivation of ligninase by hydrogen peroxide added to protein turnover, resulting in a more rapid loss of ligninase activity. Although all ligninase isoenzymes are sensitive to inactivation by hydrogen peroxide, only the isoenzyme of the highest specific activity (80.6 nkat . mg of protein<sup>-1</sup>; Mr, 41,800; pI, 3.96) was found to be protected by veratryl alcohol. The concentration of veratryl alcohol necessary for full protection of ligninase activity varied according to the concentration of hydrogen peroxide present in the medium, which depended on the nature of the carbon source (glucose or glycerol). It is proposed that the nature of the carbon source influences the overall ligninase activity not only directly, by affecting the rate and type of synthesized ligninase activity, but also by affecting the rate of hydrogen peroxide production, bringing about different rates of inactivation. Applied and Environmental microbiology. Feb 1988. v. 54 (2). p. 466-472. Includes references. (NAL Call No.: DNAL 448.3 AP5).

5702

**The influence of wood moisture content on the fungitoxicity of methylisothiocyanate in Douglas-fir heartwood.**

WOODFAJ. Zahora, A.R. Morrell, J.J. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1989. v. 21 (4). p. 343-353. Includes references. (NAL Call No.: DNAL TA419.W6).

5703

**Inhibitory effects of undecayed wood and the detection of *Postia placenta* using the enzyme-linked immunosorbent assay.**

WOSTBE. Jellison, J. Goodell, B. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1989. v. 23 (1). p. 13-20. Includes references. (NAL Call No.: DNAL SD433.A1W6).

5704

**Initial steps in the pathway for bacterial degradation of two tetrameric lignin model compounds.**

APMBA. Jokela, J. Pellinen, J.; Salkinoja-Salonen, M. Washington, D.C. : American Society for Microbiology. Applied and Environmental microbiology. Nov 1987. v. 53 (11). p. 2642-2649. Includes references. (NAL Call No.: DNAL 448.3 AP5).

5705

**Insect answers: Moisture ants.**

WUEXA. Akre, R.D. Collman, S.; Antonelli, A. Pullman, Wash. : The Service. Extension bulletin - Washington State University, Cooperative Extension Service. Dec 1986. (1382). 4 p. ill. (NAL Call No.: DNAL 275.29 W27P).

5706

**Insects and other pests in firewood.**

Rice, M.E. Baird, C.R.; McCaffrey, J.P. Moscow, Idaho : The Service. Current information series - Cooperative Extension Service, University of Idaho. Sept 1988. (834). 3 p. ill. (NAL Call No.: DNAL 275.29 ID13IDC).

5707

**Integrated protection against lyctid beetle infestations. V. Selecting efficient schedules for pressure treatment of tropical hardwood lumber with polyborates.**

FPJOA. Barnes, H.M. Williams, L.H. Madison, Wis. : Forest Products Research Society. This research investigated pressure and nonpressure methods for treating imported hardwoods with polyborates. A series of studies was designed



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to determine the most efficient schedules for use with imported hardwoods. Effective treatment was obtained with both a Lowry treatment cycle and a simple vacuum process. Treatability varied depending on the species treated. Banak was much easier to treat than was obeche. Better penetration and retention were obtained with a disodium octaborate (TimBor) compared to an ammonium pentaborate/sodium sulfate solution (AmBor-S). Selective absorption from polyborate working solutions did not occur when solutions were reused for treating repetitive charges. The use of a final vacuum in the Lowry process removed approximately 5 pcf of water (about 20% moisture content) from treated stock. Forest products journal. Sept 1988. v. 38 (9). p. 13-19. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5708

**Integrated protection against lyctid beetle infestations. II. Laboratory dip-diffusion treatment of unseasoned banak (Virola spp.) lumber with boron compounds.**

XFNSA. Williams, L.H. Mauldin, J.K. New Orleans, La. : The Station. U.S. Forest Service research note SO - United States, Southern Forest Experiment Station. Aug 1985. (313). 8 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F7628U).

5709

**Integrated protection against lyctid beetle infestations. IV. Resistance of boron-treated wood (Virola spp.) to insect and fungal attack.** FPJDA. Williams, L.H. Amburgey, T.L. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1987. v. 37 (2). p. 10-17. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5710

**Integrated protection against lyctid beetle infestations. VI. Thermal treatment of tropical hardwood lumber with polyborates.** FPJDA. Barnes, H.M. Williams, L.H. Madison, Wis. : Forest Products Research Society. Results are presented for air-dried banak that had been treated with a polyborate using a thermal treatment process. Results indicate that surface protection can be achieved using short immersion times. A diffusion storage period resulted in deeper, more uniform penetration. Forest products journal. Sept 1988. v. 38 (9). p. 20-21. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5711

**Interaction of CCA preservative treatment and redrying: effect on the mechanical properties of southern pine.**

FPJDA. Winandy, J.E. Boone, R.S.; Bendtsen, B.A. Madison, Wis. : Forest Products Research Society. Forest products journal. Oct 1985. v. 35 (10). p. 62-68. ill. Includes 15 references. (NAL Call No.: DNAL 99.9 F7662J).

5712

**Interactions between Scytalidium species and brown- or white-rot basidiomycetes in birch wood.**

WOSTBE. Cease, K.R. Blanchette, R.A.; Highley, T.L. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1989. v. 23 (2). p. 151-161. ill. Includes references. (NAL Call No.: DNAL SD433.A1W6).

5713

**Introduction of Coptotermes formosanus Shiraki to the continental United States.**

Beal, R.H. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii.~ Literature review. Oct 1987. (083). p. 48-53. Includes references. (NAL Call No.: DNAL S481.R4).

5714

**Laboratory decay resistance of preservative-treated red alder.**

WOFAJ. Mitchoff, M.E. Morrell, J.J. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. July 1988. v. 20 (3). p. 370-377. Includes references. (NAL Call No.: DNAL TA419.W6).

5715

**Laccase-mediated detoxification of phenolic compounds.**

APMBA. Bollag, J.M. Shuttleworth, K.L.; Anderson, D.H. Washington, D.C. : American Society for Microbiology. The ability of a polyphenoloxidase, the laccase of the fungus Rhizoctonia praticola, to detoxify phenolic pollutants was examined. The growth of the fungus could be inhibited by phenolic compounds, and the effective concentration was dependent on the substituents of the phenol. A toxic amount of a phenolic compound was added to a fungal growth medium in the presence or absence of a naturally occurring phenol, and half of the replicates also received laccase.

The medium was then inoculated with *R. praticola*, and the levels of phenols in the medium were monitored by high-performance liquid chromatography analysis. The addition of the laccase reversed the inhibitory effect of 2,6-xyleneol, 4-chloro-2-methylphenol, and p-cresol. Other compounds, e.g., o-cresol and 2,4-dichlorophenol, were detoxified only when laccase was used in conjunction with a natural phenol such as syringic acid. The toxicity of p-chlorophenol and 2,4,5-trichlorophenol could not be overcome by any additions. The ability of the laccase to alter the toxicity of the phenols appeared to be related to the capacity of the enzyme to decrease the levels of the parent compound by transformation or cross-coupling with another phenol. Applied and environmental microbiology. Dec 1988. v. 54 (12). p. 3086-3091. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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**A model of axial flow of organic liquids in two softwoods.**

WOSTBE. Ronze, D. Mary, M.; Romeis, M.; Zoulalian, A.; Kauman, W.G. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1988. v. 22 (1). p. 1-9. ill. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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**Natural decay resistance of baldcypress.**

Choong, E.T. Fogg, P.J.; Jones, J.P. Baton Rouge : The Station, School of Forestry & Wildlife Management. LSU wood utilization notes - Agricultural Experiment Station Research Release, Louisiana State University & A & M College. Oct 1986. (38). 4 p. Includes references. (NAL Call No.: DNAL 99.8 L933).

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**Natural decay resistance of tupelo-gum.**

Choong, E.T. Fogg, P.J.; Jones, J.P. Baton Rouge : The Station, School of Forestry & Wildlife Management. LSU wood utilization notes - Agricultural Experiment Station Research Release, Louisiana State University & A & M College. Oct 1986. (39). 3 p. Includes references. (NAL Call No.: DNAL 99.8 L933).

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**Oak sawtimber losses in stands defoliated by gypsy moth.**

Donley, D.E. Feicht, D.L. Urbana-Champaign : Dept. of Forestry, University of Illinois. 1985. Fifth Central Hardwood Forest Conference : proceedings of a meeting held at the University of Illinois at Urbana-Champaign, Illinois, April 15-17, 1985 / edited by Jeffrey O. Dawson and Kimberly A. Majerus. p. 275-279. Includes references. (NAL Call No.: DNAL SD397.H3C46 1985).

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**An overview of the Formosan subterranean termite (Isoptera: Rhinotermitidae) in the world.**

Su, N.Y. Tamashiro, M. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii. ~ Literature review. Oct 1987. (O83). p. 3-15. maps. Includes references. (NAL Call No.: DNAL S481.R4).

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**Pest management of wood-destroying organisms.**

Moore, H.B. New York : Van Nostrand Reinhold Co., c1986. Advances in urban pest management / edited by Gary W. Bennett and John M. Owens. Literature review. p. 313-333. Includes references. (NAL Call No.: DNAL SB950.8.A3).

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**Pest management principles for the commercial applicator wood-destroying organisms / Phil Pellitteri, Nick Neher, Roger Flashinski.**

Pellitteri, Phil. Neher, Nick.; Flashinski, Roger. Madison, WI : University of Wisconsin-Extension, 1988. Abstract: Training manual for commercial pesticide applicators in the wood-destroying organisms pest-control category. Major topics: wood decay in structures; termites; principles of insect control; application equipment and calibration; toxicity of pesticides; protecting human health and the environment; disposal; and label information. Includes study guide which contains multiple choice. 1 v. (various pagings) : ill. ; 30 cm. Bibliography: p. 137 (Appendix A). (NAL Call No.: DNAL SB950.2.W6W6 1988).

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**Pest management principles for the commercial applicator wood preservation pest control.**

Madison, WI : University of Wisconsin-Extension, 1988. Abstract: Training manual for commercial applicators in the wood preservation pest-control category. Major topics: wood pests; wood preservatives; application of wood preservatives; toxicity of pesticides; protecting human health and the environment; disposal; consumer information sheets; and label information. Cover title. ~ Publication statement taken from abstract sheet. ca. 147 p. : ill. ; 30 cm. Includes bibliographical references. (NAL Call No.: DNAL SB950.2.W6P4 1988).



## (FOREST PRODUCTS - WOOD)

5724

**Phenolic compound utilization by the soft rot fungus.**

APMBA. Bugos, R.C. Sutherland, J.B.; Adler, J.H. Washington, D.C. : American Society for Microbiology. Nine phenolic compounds were metabolized by the soft rot fungus *Lecythophora hoffmannii* via protocatechuic acid and subsequently cleaved by protocatechuate 3,4-dioxygenase as determined by oxygen uptake, substrate depletion, and ring cleavage analysis. Catechol was metabolized by catechol 1,2-dioxygenase. Fungal utilization of these aromatic compounds may be important in the metabolism of wood decay products. Applied and environmental microbiology. July 1988. v. 54 (7). p. 1882-1885. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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**Physical control of the Formosan subterranean termite, *Coptotermes formosanus* Shiraki.**

Yamano, K. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii. Oct 1987. (083). p. 43-47. ill. Includes references. (NAL Call No.: DNAL S481.R4).

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**Physiological characteristics of a non-degradative isolate of *Postia* (=Poria) placenta.**

MYCOAE. Micales, J.A. Highley, T.L. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Mar/Apr 1989. v. 81 (2). p. 205-215. ill. Includes references. (NAL Call No.: DNAL 450 M99).

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**Practical considerations of the Formosan subterranean termite in Louisiana: a 30-year-old problem.**

La Fage, J.P. Honolulu, Hawaii : The Service. Research extension series - College of Tropical Agriculture and Human Resources, University of Hawaii, Cooperative Extension Service. In the series analytic: Biology and control of the Formosan subterranean termite / edited by M. Tamashiro and N.Y. Su. Proceedings of an International Symposium, June 1985, Honolulu, Hawaii. ~ Literature review. Oct 1987. (083). p. 37-42. maps. Includes references. (NAL Call No.: DNAL S481.R4).

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**Preference for moist wood by the Formosan subterranean termite (Isoptera: Rhinotermitidae).**

JEENAI. Delaplane, K.S. La Fage, J.P. Lanham, Md. : Entomological Society of America. In a laboratory choice feeding test, groups of *Coptotermes formosanus* Shiraki were offered wood blocks that differed in initial moisture content. Wood-feeding rate, number of workers, and number of soldiers were highest in the high-moisture treatment. In higher-moisture blocks, damage by termites was associated with loss of block moisture, but in lower-moisture blocks, damage was associated with gain of moisture. Even though block moisture contents changed, termites determined their preferred wood blocks early, when moisture contents were more discrete, then they continued to prefer those blocks. Changes in moisture were probably the result of blocks equilibrating to ambient relative humidity of the containers, but termites enhanced this process, perhaps by actively relocating water. Our data imply that damp wood in buildings is especially vulnerable to *C. formosanus* and that bait blocks for remedial control of this pest should have high moisture content. Journal of economic entomology. Feb 1989. v. 82 (1). p. 95-100. Includes references. (NAL Call No.: DNAL 421 J822).

5729

**The preservation of wood a self study program for wood treaters / authors: Ian N. Stalker, Milton Applefield.**

Stalker, Ian N. Applefield, Milton. Athens : Cooperative Extension Service, University of Georgia, College of Agriculture, 1986. Abstract: This manual is a self study program for recertification in the category of wood treaters. It includes a self test. Cover title. ~ Developed in cooperation with Georgia Dept. of Agriculture. iii, 128 p. : ill. ; 28 cm. Includes bibliographical references and index. (NAL Call No.: DNAL TA422.S7).

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**Preservative treatment of spruce and other refractory wood.**

PAWPA. Baines, E.F. Saur, J.M. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 136-147. ill. Includes references. (NAL Call No.: DNAL 300.9 AM3).

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**Preventing and controlling powderpost beetles in and around the home.**

Capizzi, J. Corvallis, Or. : The Service. PNW - Pacific Northwest Extension Publication, Washington, Oregon, and Idaho State Universities, Cooperative Extension Service.

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July 1988. (326). 4 p. ill. (NAL Call No.: DNAL 275.29 W27PN).

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### **Preventing termite damage.**

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5733

### **Product quality and consumer acceptance of wood products from insect-damaged balsam fir.**

XGNEA. Sinclair, S.A. Broomall, Pa. : The Station. USDA Forest Service general technical report NE - United States, Northeastern Forest Experiment Station. Paper presented at the "Conference on Spruce-Fir Management and Spruce Budworm", April 24/26, 1984, Burlington, Vermont. 1985. (99). p. 87-93. Includes references. (NAL Call No.: DNAL aSD11.U56).

5734

### **Protection of oak wood (*Quercus conferta* Kit.) from liquid water uptake with water repellents.**

WOODFAJ. Voulgaridis, E. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1988. v. 20 (1). p. 68-73. Includes references. (NAL Call No.: DNAL TA419.W6).

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### **Radial distribution of thujaplicins in old growth and second growth western red cedar (*Thuja plicata* Donn).**

WOSTBE. Nault, J. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1988. v. 22 (1). p. 73-80. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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### **Recent studies with ammoniacal copper carboxylate preservatives.**

PAWPA. Preston, A.F. Walcheski, P.J.; McKaig, P.A. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 30-39. Includes references. (NAL Call No.: DNAL 300.9 AM3).

5737

### **A reddish purple stain of red alder by *Ceratocystis picea* and its prevention.**

FPJOA. Morrell, J.J. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1987. v. 37 (2). p. 18-20. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5738

### **Reducing internal and external decay of untreated Douglas-fir poles: a field test.**

FPJOA. Morrell, J.J. Smith, S.M.; Newbill, M.A.; Graham, R.D. Madison, Wis. : Forest Products Research Society. Forest products journal. Apr 1986. v. 36 (4). p. 47-52. Includes 24 references. (NAL Call No.: DNAL 99.9 F7662J).

5739

### **The reflectance method for testing the effectiveness of fungicides against surface mould growth on materials. I. Wood.**

WOSTBE. Wazny, J. Rudniewski, P.; Krajewski, K.J.; Wazny, T. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1989. v. 23 (2). p. 179-189. Includes references. (NAL Call No.: DNAL SD433.A1W6).

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### **Relation between combustion heat and chemical wood composition during whites and brown rot.**

WOSTBE. Dobry, J. Dziurzynski, A.; Rypacek, V. Secaucus, N.J. : Springer-Verlag New York Inc. Wood science and technology. 1986. v. 20 (2). p. 137-144. Includes references. (NAL Call No.: DNAL SD433.A1W6).

5741

### **Relationship of acoustic emission during radial compression to mass loss from decay.**

FPJOA. Beall, F.C. Wilcox, W.W. Madison, Wis. : Forest Products Research Society. Forest products journal. Apr 1987. v. 37 (4). p. 38-42. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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### **Research to protect wood.**

YAXAA. De Groot, R.C. Washington, D.C. : U.S. Department of Agriculture. The Yearbook of agriculture. 1986. p. 233-235. (NAL Call No.: DNAL 1 AG84Y).



## (FOREST PRODUCTS - WOOD)

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**Residue retention and fungal invasion of chloropicrin-treated Douglas-fir.**

FPJDA. Goodell, B.S. Krahmer, R.L.; Graham, R.D. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1985. v. 35 (2). p. 45-49. ill. Includes 15 references. (NAL Call No.: DNAL 99.9 F7662J).

5744

**Resistance of ACZA treated Douglas-fir heartwood to the Formosan subterranean termite.**

PAWPAG. Tamashiro, M. Yamamoto, R.; Ebesu, R. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1988. v. 84. p. 246-253. ill. Includes references. (NAL Call No.: DNAL 300.9 AM3).

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**Role of veratryl alcohol in regulating ligninase activity in Phanerochaete chrysosporium.**

APMBA. Faison, B.D. Kirk, T.K.; Farrell, R.L. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. Aug 1986. v. 52 (2). p. 251-254. Includes 19 references. (NAL Call No.: DNAL 448.3 AP5).

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**The search for new termite control strategies.**

CAGRA. Rust, M.K. Grace, J.K.; Wood, D.L.; Reiersen, D.A. Berkeley, Calif. : The Station. California agriculture - California Agricultural Experiment Station. Sept/Oct 1988. v. 42 (5). p. 15-18. ill. (NAL Call No.: DNAL 100 C12CAG).

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**Selecting a termite control service.**

Bennett, G.W. West Lafayette : The Service. Publication E - Purdue University, Cooperative Extension Service. In subseries: Household & Public Health Insects. May 1985. (2, rev.). 2 p. (NAL Call No.: DNAL SB844.I6P8).

5748

**SEM X-ray microanalysis of tracheid cell walls in southern yellow pine sapwood treated with water-dispersible pentachlorophenol.**

WOODFAJ. DeGroot, R.C. Kuster, T.A. Madison : Society of Wood Science and Technology. Wood and fiber science. Literature review. Jan 1986. v. 18 (1). p. 58-67. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5749

**Service life of Douglas-fir piles: methods for protecting cutoff tops from decay.**

FPJDA. Helsing, G.G. Morrell, J.J.; Graham, R.D. Madison, Wis. : Forest Products Research Society. Forest products journal. Feb 1986. v. 36 (2). p. 21-24. Includes 8 references. (NAL Call No.: DNAL 99.9 F7662J).

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**Shellrot control in western redcedar: potential replacements for pentachlorophenol spray.**

FPJDA. Scheffer, T.C. Morrell, J.J.; Newbill, M.A. Madison, Wis. : Forest Products Research Society. Forest products journal. July/Aug 1987. v. 37 (7/8). p. 51-54. (NAL Call No.: DNAL 99.9 F7662J).

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**Spectroscopic analysis of southern pine treated with chromated copper arsenate. II. Diffuse reflectance Fourier transform infrared spectroscopy (DRIFT).**

JWCTDJ. Ostmeyer, J.G. Elder, T.J.; Winandy, J.E. New York, N.Y. : Marcel Dekker. Journal of wood chemistry and technology. 1989. v. 9 (1). p. 105-122. Includes references. (NAL Call No.: DNAL TS932.J68).

5752

**A spider beetle, *Sphaericus gibboides* Boieldieu (Coleoptera: Ptinidae), tunneling in wood in service.**

PPETA9. Grace, J.K. San Francisco, Calif. : Pacific Coast Entomological Society. The Pan-Pacific entomologist. Oct 1985. v. 61 (4). p. 288-290. ill. (NAL Call No.: DNAL 421 P193).

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**Studies on the vaporization of pentachlorophenol from treated wood.**

AECTCV. Ingram, L.L. Jr. McGinnis, G.D.; Gjovik, L.R. New York, N.Y. : Springer-Verlag. Archives of environmental contamination and toxicology. Nov 1986. v. 15 (6). p. 669-676. ill. Includes references. (NAL Call No.: DNAL TD172.A7).

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**Subterranean termites their prevention and control in buildings /Raymond H. Beal, Joe K. Mauldin, and Susan C. Jones.**

Beal, Raymond H. Mauldin, Joe Kennon, 1941-; Jones, Susan C. Washington, D.C. : U.S. Dept. of Agriculture, Forest Service, 1986. 36 p. : ill. (some col.) ; 22 cm. Includes bibliographical references. (NAL Call No.: DNAL 1 Ag84Hg no.64 1986).

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**Suitability of hardwoods treated with phenoxy and pyridine herbicides for use as firewood.**  
AECTCV. Bush, P.B. Neary, D.G.; McMahon, C.K.; Taylor, J.W. Jr. New York, N.Y. : Springer-Verlag. Archives of environmental contamination and toxicology. May 1987. v. 16 (3). p. 333-341. Includes references. (NAL Call No.: DNAL TD172.A7).

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**A survey of structure-infesting termites of peninsular Florida.**  
FETMA. Scheffrahn, R.H. Mangold, J.R.; Su, N.Y. Gainesville, Fla. : Florida Entomological Society. Florida entomologist. Dec 1988. v. 71 (4). p. 615-630. ill., maps. Includes references. (NAL Call No.: DNAL 420 F662).

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**Termite control before and after construction.**  
Bennett, G.W. Lafayette : The Service. Publication E - Purdue University, Cooperative Extension Service. Subseries: Household & public health insects. Mar 1985. (4,rev.). 4 p. ill. (NAL Call No.: DNAL SB844.I6P8).

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**Termite resistance of wood treated with copper (II) compounds derived from tri- and dialkylamine-boric acid complexes.**  
FPJDA. Chen, G.C. Esenther, G.R.; Rowell, R.M. Madison, Wis. : Forest Products Research Society. Forest products journal. May 1986. v. 36 (5). p. 18-20. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Treatment and durability of wooden roofing materials.**  
PAWPA. Barnes, H.M. Buchanan, B.; Amburgey, T.L. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 89-108. ill., maps. Includes references. (NAL Call No.: DNAL 300.9 AM3).

5760

**Trichoderma species from Douglas-fir stumps and roots infested with Phellinus weirii in the western Cascade Mountains of Oregon.**  
MYCOAE. Goldfarb, B. Nelson, E.E.; Hansen, E.M. Bronx, N.Y. : The New York Botanical Garden. Mycologia. Jan/Feb 1989. v. 81 (1). p. 134-138. Includes references. (NAL Call No.: DNAL 450 M99).

5761

**Update on O.S.U. stain-control trials on western woods.**  
Miller, D.J. Morrell, J.J. Corvallis, Or. : School of Forestry, Oregon State University. Proceedings - Western Dry Kiln Clubs. Meeting held May 20-22, 1987.~ Includes statistical data. 1987. p. 39-44. Includes references. (NAL Call No.: DNAL 99.9 W5233).

5762

**Use of differential scanning calorimetry for structural analysis of fungally degraded wood.**  
APMBA. Reh, U. Kraepelin, G.; Lamprecht, I. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. Nov 1986. v. 52 (5). p. 1101-1106. Includes references. (NAL Call No.: DNAL 448.3 AP5).

5763

**Volatile emissions from Douglas-fir heartwood treated with Vapam or methylisothiocyanate.**  
FPJDA. Morrell, J.J. Lebow, S.T. Madison, Wis. : Forest Products Research Society. Fumigants, which play an important role in arresting and preventing decay of wood exposed to the weather, have recently been used to control decay in building timbers. The possibility exists that chemicals could migrate through the wood and be emitted inside buildings, thus posing a health hazard. Emission rates from blocks of Douglas-fir heartwood, treated with Vapam or methylisothiocyanate (MIT), were measured by placing the blocks in tanks under a stable air-flow and then analyzing air samples by gas chromatography at regular intervals. Three sulfur compounds were detected: carbon disulfide, carbonyl sulfide, and MIT. Emissions from wood treated with MIT were generally higher than those from Vapam-treated wood. Although our results indicated that emissions were detectable for at least 1 year after treatment, levels were extremely low and should not be a problem in storage buildings or in factories where air exchange is high. Fumigant treatment of wood used in tightly sealed buildings that are continually inhabited is not recommended. Forest products journal. Feb 1989. v. 39 (2). p. 41-44. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5764

**Wood-consumption rate and survival of the Formosan subterranean termite (Isoptera: Rhinotermitidae) when fed one of six woods used commercially in Hawaii.**  
PHESA. Su, N.Y. Tamashiro, M. Honolulu : The Society. Proceedings of the Hawaiian Entomological Society. Mar 1, 1986. v. 26. p. 109-113. Includes references. (NAL Call No.: DNAL 420 H312).



**(FOREST PRODUCTS - WOOD)**

**5765**

**Wood-decay fungi associated with subterranean termites (Rhinotermitidae) in Louisiana.**  
PESWA. Waller, D.A. La Fage, J.P.; Gilbertson, R.L.; Blackwell, M. Washington, D.C. : The Society. Proceedings of the Entomological Society of Washington. July 1987. v. 89 (3). p. 417-424. Includes references. (NAL Call No.: DNAL 420 W27).

**5766**

**Wood strength and weight losses caused by soft rot fungi isolated from treated southern pine utility poles.**  
WOODFAJ. Morrell, J.J. Zabel, R.A. Madison : Society of Wood Science and Technology. Wood and fiber science. Jan 1985. v. 17 (1). p. 132-143. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

**5767**

**Wood ties in '85--the challenge and the promise.**  
PAWPA. Hinson, J.E. Stevensville, Md. : The Association. Proceedings ... annual meeting - American Wood-Preservers' Association. 1985. v. 81. p. 27-29. (NAL Call No.: DNAL 300.9 AM3).

# FOREST PRODUCTS – COMPOSITE AND RECONSTITUTED WOOD

5768

**Dimensional stability, decay resistance, and mechanical properties of veneer-faced low-density particleboards made from acetylated wood.**

WOOF AJ. Rowell, R.M. Imamura, Y.; Kawai, S.; Norimoto, M. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Jan 1989. v. 21 (1). p. 67-79. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5769

**Exposure of creosoted Douglas-fir panels in Oregon coastal waters: a preliminary report.**

FPJ OA. Lebow, S.T. Morrell, J.J. Madison, Wis. : Forest Products Research Society. Forest products journal. May 1988. v. 38 (5). p. 25-30. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5770

**Strength tests on acetylated aspen flakeboards exposed to a brown-rot fungus.**

WOOF AJ. Rowell, R.M. Youngquist, J.A.; Imamura, Y. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Apr 1988. v. 20 (2). p. 266-271. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5771

**Subtropical testing of ACA-treated hardwood particleboard.**

FPJ OA. Hall, H.J. Gjovik, L.R.; Schmidt, E.L.; Gertjejansen, R.O.; Laundrie, J.F. Madison, Wis. : Forest Products Research Society. Forest products journal. Apr 1987. v. 37 (4). p. 49-53. ill. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

5772

**Trials of two powdered preservatives for phenol-formaldehyde-bonded and polymeric-isocyanate-bonded aspen structural composite board.**

FPJ OA. Schmidt, E.L. Gertjejansen, R.O. Madison, Wis. : Forest Products Research Society. Forest products journal. Mar 1988. v. 38 (3). p. 19-21. Includes references. (NAL Call No.: DNAL 99.9 F7662J).



# FOREST PRODUCTS - PULP AND PAPER

5773

**Biomechanical pulping of aspen chips by Phanerochaete chrysosporium: fungal growth pattern and effects on wood cell walls.**  
WOODFAJ. Sachs, I.B. Leatham, G.F.; Myers, G.C. Madison, Wis. : The Society. Wood and fiber science : journal of the Society of Wood Science and Technology. Oct 1989. v. 21 (4). p. 331-342. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

5774

**Fungal pretreatment of aspen chips improves strength of refiner mechanical pulp.**  
TAPPA. Myers, G.C. Leatham, G.F.; Wegner, T.H.; Blanchette, R.A. Norcross, Ga. : The Technical Association of the Pulp and Paper Industry. Tappi journal. May 1988. v. 71 (5). p. 105-108. ill. Includes references. (NAL Call No.: DNAL 302.8 T162).

# FOREST PRODUCTS - CHEMICALS

5775

**Characterization of an extracellular lignin peroxidase of the lignocellulolytic actinomycete *Streptomyces viridosporus*.**  
APMBA. Ramachandra, M. Crawford, D.L.; Hertel, G. Washington, D.C. : American Society for Microbiology. Previously we reported production of an extracellular lignin-inducible peroxidase by *Streptomyces viridosporus* (M. Ramachandra, D. L. Crawford, and A. L. Pometto III, Appl. Environ. Microbiol. 53:2754-2760, 1987). This peroxidase was shown to oxidize 3,4-dihydroxyphenylalanine, 2,4-dichlorophenol, homoprotocatechuic acid, caffeic acid, and N,N,N',N'-tetramethylphenylenediamine and was found in higher than normal levels in strains enhanced for lignocellulose degradation. In the present study, we used a pure extracellular enzyme preparation with high peroxidase isoform P3 activity to oxidize lignin substructure model compounds of both the 1,2-diaryl propane and arylglycerol-beta-aryl ether types and containing C alpha-carbonyl and C alpha-hydroxyl groups. The reactions were monitored by gas chromatography-mass spectrometry and high-pressure liquid chromatography techniques. In the presence, but not the absence, of hydrogen peroxide, the enzyme preparation catalyzed C alpha-C beta bond cleavage in the side chains of the diaryl ethers 1-(3,4-dimethoxyphenyl)-2-(2-methoxyphenoxy)propane-1,3-diol (I) and 1-(4-hydroxy-3-methoxyphenyl)-2-(2-methoxyphenoxy)propan-1-one (II) and the diaryl ethane 1-(4-methoxyphenyl)-2-(phenyl)ethan-1-one (III). Rapid hydrogen peroxide consumption was observed when the enzyme preparation was added to either milled corn lignin or lignocellulose. Additional characterizations showed that this enzyme is a heme protein (Soret band, 408 nm) and a major component of the ligninolytic system of *S. viridosporus* T7A. This is the first report of a lignin peroxidase in a bacterium. We have designated this new lignin peroxidase as ALiP-P3. Applied and environmental microbiology. Dec 1988. v. 54 (12). p. 3057-3063. ill. Includes references. (NAL Call No.: DNAL 448.3 AP5).

5776

**Characterization of leucine auxotrophs of the white rot basidiomycete *Phanerochaete chrysosporium*.**  
APMBA. Molskness, T.A. Alic, M.; Gold, M.H. Washington, D.C. : American Society for Microbiology. Applied and environmental microbiology. June 1986. v. 51 (6). p. 1170-1173. ill. Includes 26 references. (NAL Call No.: DNAL 448.3 AP5).

5777

**Effects of organic matter decomposition level and cellulose amendment on the inoculum potential of *Rhizoctonia solani* in hardwood bark media.**  
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MBREDS. Wong, K.K.Y. Tan, L.U.L.; Saddler, J.N. Washington, D.C. : American Society for Microbiology. Microbiological reviews. Literature review. Sept 1988. v. 52 (3). p. 305-317. Includes references. (NAL Call No.: DNAL 448.3 B13).

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v. 78 (1). p. 52-55. Includes references. (NAL  
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**Chip pile storage--a review of practices to avoid deterioration and economic losses.**  
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JEENAI. Gibson, R.L. Scott, J.G. Lanham, Md. : Entomological Society of America. Although carpenter ants are important pests of wooden structures throughout the United States and Canada, little is known about toxicity of insecticides to these insects. We tested 14 insecticides (3 carbamates, 7 organophosphates, and 4 pyrethroids) against two species of carpenter ants, *Camponotus novaeboracensis* (Fitch) and *C. pennsylvanicus* (DeGeer), with a residual bioassay. Deltamethrin and diazinon were the most toxic to *C. novaeboracensis* and *C. pennsylvanicus*, respectively. Pyrenone and propoxur were the least toxic. A comparison of the sensitivity of carpenter ants with four other insect species, tested under identical conditions, revealed that carpenter ants were among the most sensitive. Journal of economic entomology. Aug 1989. v. 82 (4). p. 1121-1124. Includes references. (NAL Call No.: DNAL 421 J822).

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**Control of the balsam woolly adelgid (Homoptera: Adelgidae) in Fraser fir Christmas tree plantations.**  
JEENAI. Hastings, F.L. Hain, F.P.; Mangini, A.; Huxster, W.T. College Park, Md. : Entomological Society of America. Journal of economic entomology. Dec 1986. v. 79 (6). p. 1676-1680. Includes references. (NAL Call No.: DNAL 421 J822).

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**Effects of harvest date, storage temperature, and moisture status on postharvest needle retention of Fraser fir.**  
Mitcham-Butler, E.J. Hinesley, L.E.; Pharr, D.M. Washington, D.C. : Horticultural Research Institute. Journal of environmental horticulture. Mar 1988. v. 6 (1). p. 1-4. Includes references. (NAL Call No.: DNAL SB1.J66).

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**Heat-treating wood chips: a possible solution to pine wood nematode contamination.**  
TAPPA. Kinn, D.N. Norcross, Ga. : The Technical Association of the Pulp and Paper Industry. Tappi journal. Jan 1986. v. 69 (1). p. 97-98. ill. Includes references. (NAL Call No.: DNAL 302.8 T162).

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**Movement of lauricidin in Douglas-fir stumps infested by *Phellinus weirii*.**  
NOSCA. Thies, W.G. Li, C.Y. Pullman, Wash. : Washington State University Press. Northwest science : official publication of the Northwest Scientific Association. Feb 1988. v. 62 (1). p. 16-20. ill. Includes references. (NAL Call No.: DNAL 470 N81).

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FPJ0A. Steklenski, P.G. Schmidt, E.L.; Haygreen, J.G. Madison, Wis. : Forest Products Research Society. This project investigated basic relationships of the compression dewatering and baling of wood chips. The following fundamental aspects of experimental, compression dewatered chip bales were investigated: bale durability, moisture content (MC) and distribution, biodeterioration and internal heating. These factors were studied over time with bales of three different densities. Bale physical durability was dependent on restraining forces. As restraining forces decreased (i.e., lower density bales or as bales dried below the fiber saturation point), bale integrity declined. Bales in a controlled environment (65 degrees F and 50% RH) dried in a manner similar to solid wood, that is, rapidly within the first 30 days and then at a slower rate thereafter, reaching a final MC of 15 percent (dry basis) at 98 days. However, MC distribution within bales was highly variable and only partially dependent on time, bale density, and external insulation. It is likely that internal heating, due to respiration and microorganism activity, also influenced MC distribution. Bale density and insulation (simulated stacking) were found to influence the growth of wood-inhabiting organisms that in turn produced varying levels of heat within bales. However, several temperature peaks (up to 35 degrees F above ambient conditions) were found in all bales at approximately the same time which indicated that factors other than density and insulation also influenced temperature increases within bales. Bales with higher density and slower drying rates supported extensive growth of the white-rot fungus *Phanaerochaete chrysosporium*. Wood in such colonized areas was approximately 20 percent lower in specific gravity than uncolonized wood but retained the same caloric value per unit of weight. Forest products journal. Feb 1989. v. 39 (2). p. 8-13. Includes references. (NAL Call No.: DNAL 99.9 F7662J).



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TAPPA. Kinn, D.N. Springer, E.L. Norcross, Ga.  
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## **Acid rain and the spaceship earth.**

PIWCA. Curry, N.A. Chelsea, Mich. : Lewis Publishers. Proceedings of the ... Industrial Waste Conference, Purdue University. 1986 c1987. (41st). p. 737-743. Includes references. (NAL Call No.: DNAL TP995.A1I5).

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Cheney, S. Beltsville, Md. : The Library. Quick bibliography series - National Agricultural Library (U.S.). Updates QB 86-23.- Bibliography. Jan 1987. (87-11). 21 p. (NAL Call No.: DNAL aZ5071.N3).

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## **Ambient levels of ozone reduce net photosynthesis in tree and crop species.**

SCIEA. Reich, P.B. Amundson, R.G. Washington, D.C. : American Association for the Advancement of Science. Science. Nov 1, 1985. v. 230 (4725). p. 566-570. Includes references. (NAL Call No.: DNAL 470 SC12).

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## **Atmospheric deposition and forest pest interactions.**

Smith, W.H. Washington, D.C. : U.S. Dept. of Energy, 1987. Proceedings of the Forest-Atmosphere Interaction Workshop, Lake Placid, New York, October 1-4, 1985 / coordinated and edited by Harry Moses ... et al. . p. 64-85. Includes references. (NAL Call No.: DNAL SD390.5.F6 1985).

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## **Breeding strategies in forest tree populations to buffer against elevated atmospheric carbon dioxide levels.**

Kellison, R.C. Weir, R.J. Washington, D.C. : Conservation Foundation, c1987. The Greenhouse effect, climate change, and U.S. forests / edited by William E. Shands and John S. Hoffman. p. 285-293. Includes references. (NAL Call No.: DNAL SD390.7.G73G74).

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## **Causation in forest decline.**

ESTHAG. Klein, R.M. Washington, D.C. : American Chemical Society. Environmental science & technology. Feb 1988. v. 22 (2). p. 148-149. Includes references. (NAL Call No.: DNAL TD420.A1E5).

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**Characteristics of wound-associated wood of yellow-poplar (*Liriodendron tulipifera* L.).** WOODFAJ. Lowerts, G. Wheeler, E.A.; Kellison, R.C. Madison : Society of Wood Science and Technology. Wood and fiber science. Oct 1986. v. 18 (4). p. 537-552. ill. Includes references. (NAL Call No.: DNAL TA419.W6).

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## **Charting a sustainable course.**

Brown, L.R. Wolf, E.C. New York : W.W. Norton & Company. State of the world : a Worldwatch Institute report on progress toward a sustainable society. 1987. p. 196-213. Includes references. (NAL Call No.: DNAL HC59.S73).

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## **Climate and red spruce growth and decline in the northern Appalachians.**

PNASA. Johnson, A.H. Cook, E.R.; Siccama, T.G. Washington, D.C. : The Academy. Proceedings of the National Academy of Sciences of the United States of America. Aug 1988. v. 85 (15). p. 5369-5373. Includes references. (NAL Call No.: DNAL 500 N21P).

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## **A comparative evaluation of dislodgable and penetrated residues, and persistence characteristics of aminocarb and fenitrothion, following application of several formulations onto conifer trees.**

JPFC2. Sundaram, K.M.S. New York, N.Y. : Marcel Dekker. Journal of environmental science and health. Part B. Pesticides, food contaminants, and agricultural wastes. 1986. v. 21 (6). p. 539-560. Includes references. (NAL Call No.: DNAL TD172.J61).

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CUCEB. Broderick, S.H. Ahrens, J.F.; Bender, N.K.; Corbett, E.G.; Russ, D.F.; Schroeder, D.B. Storrs, Conn. : The Service. Cooperative Extension Service, College of Agriculture, University of Connecticut : bulletin . 1987? . (87-40). 61 p. ill. Includes references. (NAL Call No.: DNAL 275.29 C76B).

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## **Damage assessment and insect disease incidence on private forest land in northern Idaho / Dwane D. Van Hooser, William M. Ciesla, Roger C. Conner.**

Van Hooser, Dwane D. Ciesla, William M.; Conner, Roger C. Ogden, UT : U.S. Dept. of



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**Development and verification on models of freezing tolerance for Douglas-fir populations in the inland Northwest.**

XFINA. Rehfeldt, G.E. Ogden, Utah : The Station. USDA Forest Service research note INT - United States Intermountain Forest and Range Experiment Station. July 1986. (369). 5 p. maps. Includes references. (NAL Call No.: DNAL A99.9 F764UN).

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**The development of old-growth douglas-fir forests northeast of Mount St. Helens, Washington, following an A.D. 1480 eruption.**

Yamaguchi, D.K. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 181-185. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

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**Disturbance and recovery of trampled montane grassland and forests in Montana.**

XFIPA. Cole, D.N. Ogden, Utah : The Station. Research paper INT - U.S. Department of Agriculture, Forest Service, Intermountain Research Station. Includes statistical data. Mar 1988. (389). 41 p. ill. Includes references. (NAL Call No.: DNAL A99.9 F764U).

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**Economic impact of decay on black walnut.**

Hart, J.H. Baughan, R.; Jennings, N.E. Bethesda, Md. : Society of American Foresters. Northern journal of applied forestry. Sept 1986. v. 3 (3). p. 116-118. ill. Includes references. (NAL Call No.: DNAL SD143.N6).

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**Economic impacts of acid rain on forest, aquatic, and agricultural ecosystems in Canada.**

Phillips, T.P. Forster, B.A. Ames, Iowa : American Agricultural Economics Association. American journal of agricultural economics. Literature review. Dec 1987. v. 69 (5). p. 963-969. Includes references. (NAL Call No.: DNAL 280.8 J822).

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**Economic impacts of ozone and acid rain: discussion.**

Segerson, K. Ames, Iowa : American Agricultural Economics Association. American journal of agricultural economics. Dec 1987. v. 69 (5). p. 970-971. Includes references. (NAL Call No.: DNAL 280.8 J822).

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**Effect of salinity on leaf ionic content and photosynthesis of Taxodium distichum L.**

AMNAA. Pezeshki, S.R. DeLaune, R.D.; Patrick, W.H. Jr. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1988. v. 119 (1). p. 185-192. Includes references. (NAL Call No.: DNAL 410 M58).

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**Effect of simulated acid rain on growth and yield of Valencia orange, Floradade tomato and slash pine in Florida.**

ETOC DK. Hart, R. Biggs, R.H.; Webb, P.G. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1986. v. 5 (1). p. 79-85. Includes 21 references. (NAL Call No.: DNAL QH545.A1E58).

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**Effect of SO2 and O3 on production of antioxidants in conifers.**

PLPHA. Mehlhorn, H. Seufert, G.; Schmidt, A.; Kunert, K.J. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1986. v. 82 (1). p. 336-338. Includes 18 references. (NAL Call No.: DNAL 450 P692).

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**Effect of thinning damage on bark beetle susceptibility indicators in loblolly pine.**

Blanche, C.A. Nebeker, T.E.; Hodges, J.D.; Karr, B.L.; Schmitt, J.J. New Orleans, La. : The Station. Forest Service general technical report SO - United States, Southern Forest Experiment Station. Paper presented at the "Third Biennial Southern Silvicultural Research Conference," November 7/8, 1984, Atlanta, Georgia. Apr 1985. (54). p. 471-479. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**The effects of acid deposition on forest ecosystems Minnesota's response : literature review /by Brian D. McCann.**

McCann, Brian D. St. Paul, Mn. (Box 44, St. Paul 55146) : State of Minnesota, Dept. of Natural Resources, Division of Forestry, 1985. "November 1985.". 43, 15 leaves :

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**Effects of air pollutants on the composition of stable carbon isotopes, delta 13C, of leaves and wood, and on leaf injury.**

PLPHA. Martin, B. Bytnerowicz, A.; Thorstenson, Y.R. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1988. v. 88 (1). p. 218-223. Includes references. (NAL Call No.: DNAL 450 P692).

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**Effects of simulated acid rain on cadmium mobilization in soils and subsequent uptake and accumulation in poplar and sunflower.**

JO SHB. Gingas, V.M. Sydnor, T.D.; Weidensaul, T.C. Alexandria, Va. : The Society. Journal of the American Society for Horticultural Science. Mar 1988. v. 113 (2). p. 258-261. Includes references. (NAL Call No.: DNAL 81 S012).

5816

**Effects of ozone or sulfur dioxide on pitch pine seedlings.**

JEVQAA. Scherzer, A.J. McClenahan, J.R. Madison, Wis. : American Society of Agronomy. Pitch pine seedlings (*Pinus rigida* Mill.) were fumigated with O<sub>3</sub> or SO<sub>2</sub> to determine their effects on growth and symptom expression. Seedlings fumigated twice with 0.20 microliter O<sub>3</sub>L-1 for 4 hr at age 14 and 22 wk had significantly greater shoot weight than those fumigated with 0.30 microliter O<sub>3</sub>L-01; 0, 0.08, 0.10, and 0.15 microliter L-1 were intermediate and not significantly different. Root starch content tended to decrease with increasing O<sub>3</sub> with control seedlings being significantly higher than the 0.15, 0.20, and 0.30 microliter O<sub>3</sub>L-1 treatments. Root starch of seedlings treated with 0.20, 0.50, 0.60, 0.70, and 0.90 microliter SO<sub>2</sub>L-1 was significantly lower than the controls. Seedlings from six families fumigated for 5 wk starting at age 6 wk differed in direction and degree of growth response when exposed to 0.08 and 0.30 microliter O<sub>3</sub>L-1. Significant differences existed among families for needle weight, shoot weight, and total weight. No differences were found among O<sub>3</sub> treatments within a family, but patterns suggest some pitch pine individuals may be sensitive to low O<sub>3</sub> while others are stimulated. Visible injury consisted of light chlorotic mottle on oldest needles. Discriminant function analysis indicated that growth responses were indistinguishable among families receiving no treatment; however, treated seedlings could be classified based on various height measurements and/or shoot weight. Differences in visible injury were apparent among families of seedlings treated with 0.40 microliter O<sub>3</sub>L-1, indicating some pitch pine families are more sensitive to O<sub>3</sub> than others. Journal of environmental quality. Jan/Mar 1989. v. 18 (1). p. 57-61. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Efficacy and timing of metsulfuron methyl in forestry in Maine.**

PNWSB. Maass, D. Prouty, R. Beltsville, Md. : The Society. Proceedings of the ... annual meeting - Northeastern Weed Science Society. 1986. v. 40. p. 230-232. (NAL Call No.: DNAL 79.9 N814).

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**A fifty year comparison of white oak (*Quercus alba*) growth in the Lehigh Valley and nearby Poconos: possible air pollution effects.**

PPASA. Halma, J.R. Rieker, D.; Majumdar, S.K. Allentown, Pa. : The Academy. Proceedings of the Pennsylvania Academy of Science. 1986. v. 60 (1). p. 39-42. maps. Includes references. (NAL Call No.: DNAL 500 P383).

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**A five year record of change for a declining scarlet oak stand in the Missouri Ozarks.**

XFGTA. Johnson, L.J. Law, J.R. St. Paul, Minn. : The Station. USDA Forest Service general technical report NC - North Central Forest Experiment Station. Paper presented at the Seventh Central Hardwood Forest Conference, Mar 5-8, 1989, Carbondale, Illinois. 1989. (132). p. 103-107. Includes 70 references. (NAL Call No.: DNAL aSD11.A352).

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**Floristic assessment of campsites in the Piedmont Region of South Carolina.**

Dunn, B.A. Carroll, W.D. Clemson, S.C. : The Station. Forest research series - South Carolina Agricultural Experiment Station. Oct 1988. (45). 68 p. Includes references. (NAL Call No.: DNAL 99.9 S0832).

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**Effects of persistent volcanic ash on Douglas-fir in Northern Idaho.**

XFIPA. Bilderback, D.E. Carlson, C.E. Ogden, Utah : The Station. USDA Forest Service research paper INT - Intermountain Research Station. Aug 1987. (380). 3 p. Includes



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### **Forest tree nursery herbicide studies in the northern Great Plains: herbicide phytotoxicity tables.**

Abrahamson, L.P. Fort Collins, Colo. : The Station. General technical report RM - Rocky Mountain Forest and Range Experiment Station, United States, Forest Service. Feb 1986. (125). p. 58-67. Includes references. (NAL Call No.: DNAL aSD11.A42).

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### **Forests are dying but is acid rain really to blame?.**

AUDUAD. Luoma, J.R. New York, N.Y. : National Audubon Society. Audubon. Mar 1987. v. 89 (2). p. 36-38, 40, 41, 44-46, 48-51. ill., maps. (NAL Call No.: DNAL S900.A8).

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### **Ghost moths & dead spruce.**

AMFOA. Egerter, D.E. Washington, D.C. : American Forestry Association. American forests. July/Aug 1989. v. 95 (7/8). p. 54-57. ill. (NAL Call No.: DNAL 99.8 F762).

5826

### **Growth and nutrient content of red spruce seedlings in soil amended with aluminum.**

JEVQAA. Ohno, T. Sucoff, E.I.; Erich, M.S.; Bloom, P.R.; Buschena, C.A.; Dixon, R.K. Madison, Wis. : American Society of Agronomy. Aluminum toxicity may be a factor linking acid deposition to forest decline. Acid precipitation may lower soil pH, which would raise the level of phytotoxic forms of Al in soil solution. A greenhouse study was conducted to examine the effects of soil Al on the growth and nutrient composition of red spruce (*Picea rubens* Sarg.). A Becker series forest soil (Typic Fragiorthod) was amended with AlCl<sub>3</sub> to give a range of saturated paste extract Al concentrations from 37 to 537 micromol L<sup>-1</sup> at harvest. Bare-rooted seedlings were transplanted into pots and grown for 52 d. Biomass of needles, primary roots, and lateral roots were not significantly decreased by soil Al levels. The biomass of needles were negatively correlated with the concentration of Al in the needles. All seedlings were P-deficient, which may account for the lack of response to soil Al levels. The concentration of Al in seedling needles increased significantly with increasing soil Al levels, but not in the primary or lateral roots. The concentration of Mn in seedling needles, primary roots, and lateral roots decreased with higher concentrations of Al in the soil. The concentrations of N, P, K, Ca, Mg, Fe, Zn, Cu, and B in the needles were not affected by soil Al. However, the Mg, Ca, and B concentrations in both primary and lateral roots were significantly lower with increasing levels of soil Al. Increasing soil Al levels resulted in

lower nitrification rates in the soils. The addition of Al significantly reduced colonies of bacteria relative to the control soil. However, fungi/actinomycetes colonies were not significantly reduced by soil Al. Journal of environmental quality. Oct/Dec 1988. v. 17 (4). p. 666-672. Includes references. (NAL Call No.: DNAL QH540.J6).

5827

### **Growth response of green and white ash seedlings to ozone, sulfur dioxide, and simulated acid rain.**

FOSCA. Chappelka, A.H. Chevone, B.I.; Burk, T.E. Bethesda, Md. : Society of American Foresters. Nine-week-old green (*Fraxinus pennsylvanica* Marsh.) and white (*F. americana* L.) ash were exposed to O<sub>3</sub> and/or SO<sub>2</sub> (control, 0.10 ppm O<sub>3</sub>, 0.08 ppm SO<sub>2</sub>, or 0.10 ppm O<sub>3</sub> + 0.08 ppm SO<sub>2</sub>) for 4 h d<sup>-1</sup>, 5 d wk<sup>-1</sup> in combination with simulated rain (pH 3.0, 4.3 or 5.6, 1 h d<sup>-1</sup>, 2 d wk<sup>-1</sup> at 0.75 cm h<sup>-1</sup>) for 6 weeks, under controlled laboratory conditions, with rain applied either just before or after fumigation. Across all rain treatments, white ash biomass was suppressed by the application of O<sub>3</sub> and cumulative shoot elongation of green ash exposed to O<sub>3</sub> and/or SO<sub>2</sub> was less than controls. The combination of O<sub>3</sub> + SO<sub>2</sub> did not affect the growth of either species more than the pollutants applied alone. Leaf area ratio (LAR) and root to shoot ratio (RSR) exhibited quadratic responses to rain pH in green ash, across all pollutant treatments. Significant pollutant X pH interactions occurred in leaf weight ratio (LWR) in green ash and LAR and RSR in white ash. Significant linear increases in LAR and decreases in RSR, with decreasing pH, were observed for O<sub>3</sub> and SO<sub>3</sub>-treated white ash. These findings are discussed relative to implications of the effects of gaseous pollutants in combination with acid rain on green and white ash growth. FOR. SCI. 34(4):1016-1029. Forest science. Dec 1988. v. 34 (4). p. 1016-1029. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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### **Growth responses and delayed winter hardening in Sitka spruce following summer exposure to ozone.**

NEPHA. Lucas, P.W. Cottam, D.A.; Sheppard, L.J.; Francis, B.J. New York, N.Y. : Cambridge University Press. The New phytologist. Apr 1988. v. 108 (4). p. 495-504. Includes references. (NAL Call No.: DNAL 450 N42).

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### **Herbicide injury to trees.**

Meade, J.A. New Brunswick, N.J. : The Service. FS - Cooperative Extension Service, Cook College. 1986. (121, rev.). 2 p. (NAL Call No.: DNAL S544.3.N5F7).

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### **Historical overview of Atlantic white cedar in the Carolinas.**

Frost, C.C. Boulder, Colo. : Westview Press, 1987. Atlantic white cedar wetlands / edited by Aimlee D. Laderman. Paper presented at the First Atlantic White Cedar Wetlands Symposium, held at the Marine Biological Laboratory, Woods Hole, Massachusetts, October, 1984. p. 257-264. maps. Includes references. (NAL Call No.: DNAL QK938.M3A8).

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### **How trees survive after injury and infection.**

Shigo, A.L. Washington, D.C. : United States Dept. of Agriculture, Agricultural Research Service, 1985. 1984 Stone Fruit Tree Decline Workshop proceedings : proceedings, workshop held Oct 30-Nov 1, 1984 at the Appalachian Fruit Research Station, Kearneysville, WV / Charles L. Wilson and Ralph Scorza, wo. p. 29-40. Includes references. (NAL Call No.: DNAL aSB608.S83S75 1984).

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### **Increase in Pinus strobus needle transectional areas in response to acid misting.**

AECTCV. Maurice, C.G. Crang, R.E. New York, N.Y. : Springer-Verlag. Archives of environmental contamination and toxicology. Jan 1986. v. 15 (1). p. 77-82. ill. Includes references. (NAL Call No.: DNAL TD172.A7).

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### **The integrated forest study on effects of atmospheric deposition.**

Johnson, D.W. Lindberg, S.E.; Pitelka, L.F.; Bondietti, E.A. Atlanta, Ga. : TAPPI Press. Annual meeting - Technical Association of the Pulp and Paper Industry. Meeting held on March 2-5, Atlanta, Georgia. 1986. p. 3-13. ill. Includes references. (NAL Call No.: DNAL TS1080.T325).

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### **Interactions between ozone and plant cuticles. II. Water permeability.**

NEPHA. Kerstiens, G. Lenzian, K.J. New York, N.Y. : Cambridge University Press. The New phytologist. May 1989. v. 112 (1). p. 21-27. Includes references. (NAL Call No.: DNAL 450 N42).

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### **Interim assessment the causes and effects of acidic deposition /Charles N. Herrick, managing editor.**

Herrick, Charles N. Washington, DC : National Acid Precipitation Assessment Program, Office of the Director of Research, 1987? . Cover title: NAPAP interim assessment.~ At head of cover title: The National Acid Precipitation Assessment Program. 4 v. : ill., maps ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL TD196.A25I64).

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### **Introduction to tropical rain forests.**

Prance, G.T. Boulder, Colo. : Westview Press, c1986. Tropical rain forests and the world atmosphere / edited by Ghilleen T. Prance. p. 1-8. Includes references. (NAL Call No.: DNAL SD390.5.P7).

5837

### **Investigations on the effect of ozone on leaves of pinto bean (*Phaseolus vulgaris* L.) and beech yearlings (*Fagus sylvatica* L.).**

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6039

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# BIOMASS ENERGY SOURCES

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## **Suitability of hardwoods treated with phenoxy and pyridine herbicides for use as firewood.**

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# CONSEQUENCES OF ENERGY PRODUCTION AND USE

6043

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## Atmospheric deposition effects on loblolly pine: development of an intensive field research site.

Chappelka, A.H. Lockaby, B.G.; Meldahl, R.S.; Kush, J.S. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 57-60. Includes references. (NAL Call No.: DNAL aSD11.U57).

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## Biodegradation of Pentachlorophenol by the white rot fungus *Phanerochaete chrysosporium*.

APMBA. Mileski, G.J. Bumpus, J.A.; Jurek, M.A.; Aust, S.D. Washington, D.C. : American Society for Microbiology. Extensive biodegradation of pentachlorophenol (PCP) by the white rot fungus *Phanerochaete chrysosporium* was demonstrated by the disappearance and mineralization of <sup>14</sup>C PCP in nutrient nitrogen-limited culture. Mass balance analyses demonstrated the formation of water-soluble metabolites of <sup>14</sup>C PCP during degradation. Involvement of the lignin-degrading system of this fungus was

suggested by the fact that the time of onset, time course, and eventual decline in the rate of PCP mineralization were similar to those observed for <sup>14</sup>C lignin degradation. Also, a purified ligninase was shown to be able to catalyze the initial oxidation of PCP. Although biodegradation of PCP was decreased in nutrient nitrogen-sufficient (i.e., nonligninolytic) cultures of *P. chrysosporium*, substantial biodegradation of PCP did occur, suggesting that in addition to the lignin-degrading system, another degradation system may also be responsible for some of the PCP degradation observed. Toxicity studies showed that PCP concentrations above 4 mg/liter (15 microM) prevented growth when fungal cultures were initiated by inoculation with spores. The lethal effects of PCP could, however, be circumvented by allowing the fungus to establish a mycelial mat before adding PCP. With this procedure, the fungus was able to grow and mineralize <sup>14</sup>C PCP at concentrations as high as 500 mg/liter (1.9 mM). Applied and environmental microbiology. Dec 1988. v. 54 (12). p. 2885-2889. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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JEVQAA. Land, F.J. Bingham, F.T.; Hendrix, F.F.; Crane, N.L. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. July/Sept 1986. v. 15 (3). p. 260-265. Includes references. (NAL Call No.: DNAL QH540.J6).

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## Buffer capacities of leaves, leaf cells, and leaf cell organelles in relation to fluxes of potentially acidic gases.

PLPHA. Pfanz, H. Heber, U. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. June 1986. v. 81 (2). p. 597-602. Includes 38 references. (NAL Call No.: DNAL 450 P692).



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**Characteristics of air exclusion systems vs. chambers for field air pollution studies.**  
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**The characterization of ozone data for sites located in forested areas of the Eastern United States.**  
JPCAAC. Pinkerton, J.E. Lefohn, A.S. Pittsburgh, Pa. : The Association. Journal of the Air Pollution Control Association. Sept 1987. v. 37 (9). p. 1005-1010. maps. Includes references. (NAL Call No.: DNAL 449.9 AI7).

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**A comparative evaluation of the effects of acid precipitation, natural acid production, and harvesting on cation removal from forests /Dale W. Johnson ; co-investigators, J.M. Kelly ... et al. . --.**  
Johnson, D. W. Kelly, J. M. Oak Ridge, Tenn.? : Environmental Sciences Division, Oak Ridge National Laboratory?, 1985? . Cover title.~ "Task group project: F7-07."~ This research has been funded as part of the National Acid Precipitation Assessment Program by the Environmental Protection Agency under the Interagency Agreement Number 79DX0533 along with the Electr~ "DOE/OR/21400--T113."~ Publication no. 2508, Environmental Sciences. Div., ORNL.~ "DE85 O10821." 1 v. (various pagings) : ill. ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL QH545.A17J6).

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AESTC. Chamberlain, A.C. New York, N.Y. : John Wiley & Sons. Advances in environmental science and technology. 1986. v. 18. p. 189-209. Includes references. (NAL Call No.: DNAL TD180.A3).

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**Distribution and persistence of trichlorfon in a forest environment.**  
JPFC2. Sundaram, K.M.S. Varty, I.W. New York, N.Y. : Marcel Dekker. Journal of environmental science and health : Part B : Pesticides, food contaminants, and agricultural wastes. 1989. v. 24 (6). p. 647-659. Includes references. (NAL Call No.: DNAL TD172.J61).

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**Effect of salinity on leaf ionic content and photosynthesis of Taxodium distichum L.**  
AMNAA. Pezeshki, S.R. DeLaune, R.D.; Patrick, W.H. Jr. Notre Dame, Ind. : University of Notre Dame. American midland naturalist. Jan 1988. v. 119 (1). p. 185-192. Includes references. (NAL Call No.: DNAL 410 M58).

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**Effect of simulated acid rain on growth and yield of Valencia orange, Floradade tomato and slash pine in Florida.**  
ETOC DK. Hart, R. Biggs, R.H.; Webb, P.G. Elmsford : Pergamon Press. Environmental toxicology and chemistry. 1986. v. 5 (1). p. 79-85. Includes 21 references. (NAL Call No.: DNAL QH545.A1E58).

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**Effects of air pollutants on the composition of stable carbon isotopes, delta 13C, of leaves and wood, and on leaf injury.**  
PLPHA. Martin, B. Bytnerowicz, A.; Thorstenson, Y.R. Rockville, Md. : American Society of Plant Physiologists. Plant physiology. Sept 1988. v. 88 (1). p. 218-223. Includes references. (NAL Call No.: DNAL 450 P692).

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**Effects of atmospheric deposition on sulfur and nitrogen content of four urban tree species.**  
JOARD. Roberts, B.R. Dochinger, L.S.; Townsend, A.M. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Sept 1986. v. 12 (9). p. 209-212. Includes references. (NAL Call No.: DNAL SB436.J6).

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**Effects of chronic doses of ozone on loblolly pine: photosynthetic characteristics in the third growing season.**  
FOSCA. Sasek, T.W. Richardson, C.J. Bethesda, Md. : Society of American Foresters. Gas exchange characteristics of loblolly pine seedlings were measured in the third growing season of ozone fumigations to determine the effects of long-term ozone exposure on photosynthetic capacity. Light and CO2 response

curves indicated significant decreases of 21% and 27%, respectively, in light-saturated and CO<sub>2</sub>-saturated photosynthetic capacities at 2 X ambient ozone (92 ppb 12-hr seasonal mean) compared to charcoal-filtered (CF) air, approximately 0.5 X ambient ozone (29 ppb 12-hr seasonal mean). Differences in the response curves suggest changes in light-harvesting and biochemical efficiencies as well as changes in the activity of RuBP Carboxylase and the regeneration rate of RuBP. Chlorophyll and carotenoid conditions per unit leaf area were decreased at the high ozone treatment in older flushes. Stomatal resistance limited photosynthesis by about 29% in both CF and 2 X ambient ozone treated plants, suggesting that chronic ozone exposure did not affect stomatal control in loblolly pine. *Forest science*. Sept 1989. v. 35 (3). p. 745-755. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Effects of insecticide use in a pine seed orchard on pesticide levels in fish.**

WARBA. Bush, P.B. Neary, D.G.; Taylor, J.W. Jr.; Nutter, W.L. Minneapolis, Minn. : American Water Resources Association. *Water resources bulletin*. Oct 1986. v. 22 (5). p. 817-827. maps. Includes references. (NAL Call No.: DNAL 292.9 AM34).

6100

**Effects of ozone or sulfur dioxide on pitch pine seedlings.**

JEVQAA. Scherzer, A.J. McClenahan, J.R. Madison, Wis. : American Society of Agronomy. Pitch pine seedlings (*Pinus rigida* Mill.) were fumigated with O<sub>3</sub> or SO<sub>2</sub> to determine their effects on growth and symptom expression. Seedlings fumigated twice with 0.20 microliter O<sub>3</sub>-L-1 for 4 hr at age 14 and 22 wk had significantly greater shoot weight than those fumigated with 0.30 microliter O<sub>3</sub>-L-01; 0, 0.08, 0.10, and 0.15 microliter L-1 were intermediate and not significantly different. Root starch content tended to decrease with increasing O<sub>3</sub> with control seedlings being significantly higher than the 0.15, 0.20, and 0.30 microliter O<sub>3</sub>-L-1 treatments. Root starch of seedlings treated with 0.20, 0.50, 0.60, 0.70, and 0.90 microliter SO<sub>2</sub>-L-1 was significantly lower than the controls. Seedlings from six families fumigated for 5 wk starting at age 6 wk differed in direction and degree of growth response when exposed to 0.08 and 0.30 microliter O<sub>3</sub>-L-1. Significant differences existed among families for needle weight, shoot weight, and total weight. No differences were found among O<sub>3</sub> treatments within a family, but patterns suggest some pitch pine individuals may be sensitive to low O<sub>3</sub> while others are stimulated. Visible injury consisted of light chlorotic mottle on oldest needles. Discriminant function analysis indicated that growth responses were indistinguishable among families receiving no treatment; however, treated seedlings could be classified based on various height measurements and/or shoot

weight. Differences in visible injury were apparent among families of seedlings treated with 0.40 microliter O<sub>3</sub>-L-1, indicating some pitch pine families are more sensitive to O<sub>3</sub> than others. *Journal of environmental quality*. Jan/Mar 1989. v. 18 (1). p. 57-61. Includes references. (NAL Call No.: DNAL QH540.J6).

6101

**Effects of tebuthiuron site preparation on white-tailed deer habitat.**

WLSBA. DeFazio, J.T. Jr. Stone, A.E.; Warren, R.J. Bethesda, Md. : The Society. *Wildlife Society bulletin*. Spring 1988. v. 16 (1). p. 12-18. (NAL Call No.: DNAL SK357.A1W5).

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**Endangered species.**

PGPCA. Mathews, L. Lincoln, Neb. : The Council. *Proceedings - Great Plains Agricultural Council*. June 1988. p. 117-119. (NAL Call No.: DNAL 282.9 G7992).

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**Environmental fate of Dimilin 25-W in a Central Appalachian forest.**

BECTA. Martinat, P.J. Christman, V.; Cooper, R.J.; Dodge, K.M.; Whitmore, R.C.; Booth, G.; Seide, G. New York, N.Y. : Springer-Verlag. *Bulletin of environmental contamination and toxicology*. July 1987. v. 39 (1). p. 142-149. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

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**Environmental fate of sulfometuron methyl in southern forest watersheds.**

SWSPBE. Michael, J.L. Neary, D.G. Raleigh, N.C. : The Society. *Proceedings - Southern Weed Science Society*. Paper presented at the "Meeting on Environmental Legislation and its Effects on Weed Science," Jan 18/20, 1988, Tulsa, Oklahoma. Includes abstract. 1988. v. 41. p. 219. (NAL Call No.: DNAL 79.9 S08 (P)).

6105

**A fifty year comparison of white oak (*Quercus alba*) growth in the Lehigh Valley and nearby Poconos: possible air pollution effects.**

PPASA. Halma, J.R. Rieker, D.; Majumdar, S.K. Allentown, Pa. : The Academy. *Proceedings of the Pennsylvania Academy of Science*. 1986. v. 60 (1). p. 39-42. maps. Includes references. (NAL Call No.: DNAL 500 P383).



## (POLLUTION)

6106

### **Fluoride-induced enhancement and inhibition of shoot growth in four taxa of Pinus.**

NEPHA. Doley, D. New York, N.Y. : Cambridge University Press. The New phytologist. Aug 1989. v. 112 (4). p. 543-552. Includes references. (NAL Call No.: DNAL 450 N42).

6107

### **Forests are dying but is acid rain really to blame?.**

AUDUAD. Luoma, J.R. New York, N.Y. : National Audubon Society. Audubon. Mar 1987. v. 89 (2). p. 36-38, 40, 41, 44-46, 48-51. ill., maps. (NAL Call No.: DNAL S900.A8).

6108

### **Gaseous air pollutants.**

AESTC. Miller, P.R. Kickert, R.N. New York, N.Y. : John Wiley & Sons. Advances in environmental science and technology. 1986. v. 18. p. 581-601. Includes references. (NAL Call No.: DNAL TD180.A3).

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### **Gauging the biological impacts of the greenhouse effect.**

BISNA. Cohn, J.P. Washington, D.C. : The Institute. BioScience - American Institute of Biological Sciences. Mar 1989. v. 39 (3). p. 142-146. ill. (NAL Call No.: DNAL 500 AM322A).

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### **Growth and nutrient content of red spruce seedlings in soil amended with aluminum.**

JEVQAA. Ohno, T. Sucoff, E.I.; Erich, M.S.; Bloom, P.R.; Buschena, C.A.; Dixon, R.K. Madison, Wis. : American Society of Agronomy. Aluminum toxicity may be a factor linking acid deposition to forest decline. Acid precipitation may lower soil pH, which would raise the level of phytotoxic forms of Al in soil solution. A greenhouse study was conducted to examine the effects of soil Al on the growth and nutrient composition of red spruce (*Picea rubens* Sarg.). A Becker series forest soil (Typic Fragiorthod) was amended with AlCl<sub>3</sub> to give a range of saturated paste extract Al concentrations from 37 to 537 micromol L<sup>-1</sup> at harvest. Bare-rooted seedlings were transplanted into pots and grown for 52 d. Biomass of needles, primary roots, and lateral roots were not significantly decreased by soil Al levels. The biomass of needles were negatively correlated with the concentration of Al in the needles. All seedlings were P-deficient, which may account for the lack of response to soil Al levels. The concentration of Al in seedling needles increased significantly with increasing soil Al levels, but not in the primary or lateral roots. The

concentration of Mn in seedling needles, primary roots, and lateral roots decreased with higher concentrations of Al in the soil. The concentrations of N, P, K, Ca, Mg, Fe, Zn, Cu, and B in the needles were not affected by soil Al. However, the Mg, Ca, and B concentrations in both primary and lateral roots were significantly lower with increasing levels of soil Al. Increasing soil Al levels resulted in lower nitrification rates in the soils. The addition of Al significantly reduced colonies of bacteria relative to the control soil. However, fungi/actinomycetes colonies were not significantly reduced by soil Al. Journal of environmental quality. Oct/Dec 1988. v. 17 (4). p. 666-672. Includes references. (NAL Call No.: DNAL QH540.J6).

6111

### **Growth declines in red spruce.**

JFUSA. Zedaker, S.M. Hyink, D.M.; Smith, D.W. Bethesda, Md. : Society of American Foresters. Journal of forestry. Jan 1987. v. 85 (1). p. 34-36. ill. Includes references. (NAL Call No.: DNAL 99.8 F768).

6112

### **Growth response of green and white ash seedlings to ozone, sulfur dioxide, and simulated acid rain.**

FOSCA. Chappelka, A.H. Chevone, B.I.; Burk, T.E. Bethesda, Md. : Society of American Foresters. Nine-week-old green (*Fraxinus pennsylvanica* Marsh.) and white (*F. americana* L.) ash were exposed to O<sub>3</sub> and/or SO<sub>2</sub> (control, 0.10 ppm O<sub>3</sub>, 0.08 ppm SO<sub>2</sub>, or 0.10 ppm O<sub>3</sub> + 0.08 ppm SO<sub>2</sub>) for 4 h d<sup>-1</sup>, 5 d wk<sup>-1</sup> in combination with simulated rain (pH 3.0, 4.3 or 5.6, 1 h d<sup>-1</sup>, 2 d wk<sup>-1</sup> at 0.75 cm h<sup>-1</sup>) for 6 weeks, under controlled laboratory conditions, with rain applied either just before or after fumigation. Across all rain treatments, white ash biomass was suppressed by the application of O<sub>3</sub> and cumulative shoot elongation of green ash exposed to O<sub>3</sub> and/or SO<sub>2</sub> was less than controls. The combination of O<sub>3</sub> + SO<sub>2</sub> did not affect the growth of either species more than the pollutants applied alone. Leaf area ratio (LAR) and root to shoot ratio (RSR) exhibited quadratic responses to rain pH in green ash, across all pollutant treatments. Significant pollutant X pH interactions occurred in leaf weight ratio (LWR) in green ash and LAR and RSR in white ash. Significant linear increases in LAR and decreases in RSR, with decreasing pH, were observed for O<sub>3</sub> and SO<sub>2</sub>-treated white ash. These findings are discussed relative to implications of the effects of gaseous pollutants in combination with acid rain on green and white ash growth. FOR. SCI. 34(4):1016-1029. Forest science. Dec 1988. v. 34 (4). p. 1016-1029. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Herbicides in southern forestry--improving water quality.**

SWSPBE. Neary, D.G. Bush, P.E.; Michael, J.L. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. 1986. (39th). p. 335-341. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

6114

**History of the chemical environment from elemental analysis of tree rings.**

McClenahan, J.R. Vimmerstedt, J.P.; Lathrop, R.C. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 690-694. (NAL Call No.: DNAL QK477.2.A6I5 1986).

6115

**How it might be: forests.**

Winjum, J.K. Neilson, R.P. Washington, D.C. : Office of Public Awareness. EPA journal. Jan/Feb 1989. v. 15 (1). p. 11-13. ill. Includes references. (NAL Call No.: DNAL TD171.U5).

6116

**In vitro and in vivo effects of acidity and trace elements on pollen function.**

Cox, R.M. New York : Springer-Verlag, c1986. Biotechnology and ecology of pollen : proceedings, International Conference on Biotechnology and Ecology of Pollen, 9-11 July 1985, Univ. of Massachusetts, Amherst, MA / ed. by D.L. Mulcahy, G.B. Mulcahy and E. Ottaviano. p. 95-100. ill. Includes references. (NAL Call No.: DNAL QK658.B575).

6117

**Increase in Pinus strobus needle transectional areas in response to acid misting.**

AEOTCV. Maurice, C.G. Crang, R.E. New York, N.Y. : Springer-Verlag. Archives of environmental contamination and toxicology. Jan 1986. v. 15 (1). p. 77-82. ill. Includes references. (NAL Call No.: DNAL TD172.A7).

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**Influence of automobile exhaust and lead on the oxygen exchange of two lichens measured by a new oxygen electrode method.**

Lemaistre, V. New York : Plenum Press, c1985. Lichen physiology and cell biology / edited by D.H. Brown. p. 173-183. ill. Includes references. (NAL Call No.: DNAL QK581.L49).

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**Interim assessment the causes and effects of acidic deposition /Charles N. Herrick, managing editor.**

Herrick, Charles N. Washington, DC : National Acid Precipitation Assessment Program, Office of the Director of Research, 1987? . Cover title: NAPAP interim assessment.~ At head of cover title: The National Acid Precipitation Assessment Program. 4 v. : ill., maps ; 28 cm. Includes bibliographies. (NAL Call No.: DNAL TD196.A25I64).

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**Investigations on the effect of ozone on leaves of pinto bean (*Phaseolus vulgaris* L.) and beech yearlings (*Fagus sylvatica* L.).**

Masuch, G. Kettrup, A. Deerfield Beach, Fla. : VCH Publishers, c1985. Air pollution and plants / edited by Clement Troyanowsky. Presented at the 2nd "European Conference on Chemistry and the Environment," May 21-24, 1984, Lindau, West Germany. p. 142-145. Includes 3 references. (NAL Call No.: DNAL QK751.E97 1984).

6121

**Laboratory measurements of ozone removal by plants, and application to rural ozone records.**

Steinberger, E.H. Wurtele, M.G. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 400-403. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

6122

**Laccase-mediated detoxification of phenolic compounds.**

APMBA. Bollag, J.M. Shuttleworth, K.L.; Anderson, D.H. Washington, D.C. : American Society for Microbiology. The ability of a polyphenoloxidase, the laccase of the fungus *Rhizoctonia praticola*, to detoxify phenolic pollutants was examined. The growth of the fungus could be inhibited by phenolic compounds, and the effective concentration was dependent on the substituents of the phenol. A toxic amount of a phenolic compound was added to a fungal growth medium in the presence or absence of a naturally occurring phenol, and half of the replicates also received laccase. The medium was then inoculated with *R. praticola*, and the levels of phenols in the medium were monitored by high-performance liquid chromatography analysis. The addition of the laccase reversed the inhibitory effect of 2,6-xyleneol, 4-chloro-2-methylphenol, and p-cresol. Other compounds, e.g., o-cresol and 2,4-dichlorophenol, were detoxified only when laccase was used in conjunction with a natural phenol such as syringic acid. The toxicity of p-chlorophenol and 2,4,5-trichlorophenol could



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not be overcome by any additions. The ability of the laccase to alter the toxicity of the phenols appeared to be related to the capacity of the enzyme to decrease the levels of the parent compound by transformation or cross-coupling with another phenol. Applied and environmental microbiology. Dec 1988. v. 54 (12). p. 3086-3091. Includes references. (NAL Call No.: DNAL 448.3 AP5).

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**Last stand of the red spruce /Robert A. Mello ; introduction by Patrick J. Leahy.**

Mello, Robert A., 1946-. Washington, D.C. : Island Press ; New York City? : Natural Resources Defense Council, c1987. Includes index. xviii, 199 p. : ill. ; 23 cm. Bibliography: p. 179-189. (NAL Call No.: DNAL SB608.R33M45).

6124

**Leaf-to-twigg transfer conserves nitrogen and phosphorus in nutrient poor and enriched cypress swamps.**

FOSCA, Dierberg, F.E. Straub, P.A.; Hendry, C.D. Bethesda, Md. : Society of American Foresters. Forest science. Dec 1986. v. 32 (4). p. 900-913. Includes references. (NAL Call No.: DNAL 99.8 F7632).

6125

**Lichens, tree growth, and foliar symptoms of air pollution: are the stories consistent?.**

JEVQAA. Muir, P.S. McCune, B. Madison, Wis. : American Society of Agronomy. Lichen communities, tree growth, and foliar symptoms of *Acer saccharum*, *Fraxinus* spp., *Liriodendron tulipifera*, *Quercus alba*, and the *Quercus rubra* group were studied in relation to air pollutants in southern Indiana and Illinois. Both study areas receive regional pollutants, but only one is close to a large coal-fired utility, which results in a high dose of SO<sub>2</sub> and its reaction products. Lichen communities differed significantly between the two areas; species richness and total cover were lowest in the near-utility area, and species compositional differences suggested that air quality was responsible. Few differences were noted in foliar symptoms between areas; when symptom levels differed, they were generally highest in the remote area. Ozone-induced stippling was found in both areas on leaves of *Fraxinus* spp. and *Liriodendron*. Although ring widths indicated depressed tree growth in the near-utility area during years of high emissions, periodic basal area increments and tree vigor did not generally differ between areas, and were generally not related to foliar symptoms other than stippling. Ozone-induced stippling on *Liriodendron* was negatively correlated with basal area increments. Journal of environmental quality. July/Sept 1988. v. 17 (3). p. 361-370. Includes references. (NAL Call No.: DNAL QH540.J6).

6126

**Lindane and fenitrothion reduce soil and litter mesofauna on Piedmont and Appalachian sites.**

EVETEX. Hastings, F.L. Brady, U.E.; Jones, A.S. Lanham, Md. : Entomological Society of America. Lindane applied to pines as an aqueous 0.5% spray for control of the southern pine beetle, *Dendroctonus frontalis* Zimmermann, caused long-term reductions in litter and soil mesofaunal populations in the mountains of North Carolina. Mites, collembolans, and other arthropod fauna did not return to pretreatment numbers for at least 2 yr, and soil mesofauna remained below initial populations even after 963 d. Although lindane remained in the litter and soil for about 3 yr, it did not move downslope in quantities that threatened water quality. In the Piedmont, aqueous 0.5% lindane and 2.0% fenitrothion were applied directly to the forest floor. Although initial fenitrothion residues were 7.5 times greater than those of lindane, the transient nature of these residues and reduced effects on mites and collembolans indicate it has a shorter-term effect on soil and litter fauna. Environmental entomology. Apr 1989. v. 18 (2). p. 245-250. Includes references. (NAL Call No.: DNAL QL461.E532).

6127

**Measurement of aminocarb in long-distance drift following aerial application to forests.**

BECTAG. Riley, C.M. Wiesner, C.J.; Ecobichon, D.J. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Jan 1989. v. 42 (1). p. 37-44. ill. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

6128

**Mobility and persistence of hexazinone in a forest watershed.**

JEVQAA. Bouchard, D.C. Lavy, T.L.; Lawson, E.R. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Apr/June 1985. v. 14 (2). p. 229-233. Includes 21 references. (NAL Call No.: DNAL QH540.J6).

6129

**Modeling for aerial spray buffer zone /prepared by John W. Barry, James E. Rafferty, Robert B. Ekblad.**

Barry, John Willard, 1934-. Rafferty, J. E.; Ekblad, Robert B. Davis, CA : USDA Forest Service, Forest Pest Management, 1987. "June 1987.". ii, 16 leaves : ill. ; 28 cm. Bibliography: leaf 16. (NAL Call No.: DNAL aSB953.B36).

6130

**Modeling SO2 effects on forest growth and community dynamics.**

Shugart, H.H. McLaughlin, S.B. Jr. Stanford, Calif. : Stanford University Press, 1985. Sulfur dioxide and vegetation : physiology, ecology, and policy issues / edited by William E. Winner, Harold A. Mooney, and Robert A. Goldstein. p. 478-491. maps. (NAL Call No.: DNAL QK753.S85S85).

6131

**National Vegetation Survey/Forest Response Program.**

Barnard, J.E. Blacksburg, VA : Society of American Foresters, 1986. Atmospheric deposition and forest productivity : proceedings of the Fourth Regional Technical Conference at the Sixty-fifth Annual Meeting of the Appalachian Society of American Foresters, Raleigh, NC, Jan. 29-31, 1986. p. 93-97. Includes references. (NAL Call No.: DNAL SD387.E58A66 1986).

6132

**Nutrient uptake and growth responses of Virginia pine to elevated atmospheric carbon dioxide.**

JEVQAA. Luxmoore, R.J. O'Neill, E.G.; Ellis, J.M.; Rogers, H.H. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. July/Sept 1986. v. 15 (3). p. 244-251. Includes references. (NAL Call No.: DNAL QH540.J6).

6133

**Oak decline and mortality in the southeast: an assessment.**

Starkey, D.A. Brown, H.D. Memphis, Tenn. : Harwood Research Council. Proceedings - Annual Hardwood Symposium of the Hardwood Research Council. 1986. (14th). p. 103-114. maps. Includes references. (NAL Call No.: DNAL SD397.H3H37).

6134

**Ozone and sulfur dioxide effects on the ultrastructure of the chloroplasts of hybrid poplar leaves.**

BECTA. Pechak, D.G. Noble, R.D.; Dochinger, L. New York, N.Y. : Springer-Verlag. Bulletin of environmental contamination and toxicology. Mar 1986. v. 36 (3). p. 421-428. ill. Includes references. (NAL Call No.: DNAL RA1270.P35A1).

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**The path from here integrated forest protection for the future /by The Integrated Pest Management Working Group; editors: Dave Brown, Samuel M. Hitt, William H. Moir.**

Integrated Pest Management Working Group (U.S.). Brown, Dave.; Hitt, Samuel M.; Moir, William H. United States : The Group ; Washington, D.C. : U.S. G.P.O., Supt. of Doc. , 1986. "January 1986."~ "The Integrated Pest Management Working Group was established by an out-of-court settlement between the Committee for Integrated Pest Management and the USDA Forest Service. The USDA Forest Service has agreed to issue a response to the recommendations in this report within 60 days of issuance of the report"--T.p. verso. 1 v. (various pagings) ; 29 cm. Includes bibliographies. (NAL Call No.: DNAL S970.4.U5I6).

6136

**Pesticides in forestry and agriculture: effects on aquatic habitats.**

AESTC. Eidt, D.C. Hollebone, J.E.; Lockhart, W.L.; Kingsbury, P.D.; Gadsby, M.C.; Ernst, W.R. New York, N.Y. : John Wiley & Sons. Advances in environmental science and technology. In the series analytic: Aquatic toxicology and water quality management / edited by J.O. Nriagu and J.S.S. Lakshminarayana. 1989. v. 22. p. 245-283. Includes references. (NAL Call No.: DNAL TD180.A3).

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**Pesticides issues: public ignorance is not bliss.**

Witt, T.L. Van Nuys, Calif. : Gold Trade Publications. Arbor age. June 1989. v. 9 (6). p. 16-18. (NAL Call No.: DNAL SB435.5.A645).

6138

**Photosynthesis and growth response of red spruce and loblolly pine to soil-applied lead and simulated acid rain.**

FOSCA. Seiler, J.R. Paganelli, D.J. Bethesda, Md. : Society of American Foresters. Forest science. Sept 1987. v. 33 (3). p. 668-675. Includes references. (NAL Call No.: DNAL 99.8 F7632).

6139

**Photosynthetic response of yellow-poplar seedlings to the antioxidant chemical ethylenediurea.**

JOARD. Roberts, B.R. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. June 1987. v. 13 (6). p. 154-158. Includes references. (NAL Call No.: DNAL SB436.J6).



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6140

**Picloram movement in an Appalachian hardwood forest watershed.**  
JEVQAA. Neary, D.G. Bush, P.B.; Douglass, J.E.; Todd, R.L. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1985. v. 14 (4). p. 585-592. maps. Includes references. (NAL Call No.: DNAL QH540.J6).

6141

**Picloram movement in soil solution and streamflow from a coastal plain forest.**  
JEVQAA. Michael, J.L. Neary, D.G.; Wells, M.J.M. Madison, Wis. : American Society of Agronomy. Picloram (4-amino-2,5,6-trichloropicolinic acid) was aerially applied to a longleaf pine (*Pinus palustris* L.) site in the upper coastal plain of Alabama to control kudzu *Pueraria lobata* (Willd.) Ohwi. Pellets (10% a.i.) were spread at the rate of 56 kg ha<sup>-1</sup> on loamy sand Typic Kanhapludult soils. Movement of this herbicide was monitored with mineral soil samples, tension-cup lysimeters, flowproportional streamflow samplers, and discrete samplers. Picloram levels in the upper 15 cm of mineral soil peaked at 0.96 to 2.25 mg kg<sup>-1</sup> 25 d after application, depending on slope position, and declined to 0.13 to 0.29 mg kg<sup>-1</sup> 1 yr later. In soil solution, picloram was detected at a depth of 0.4 m between 26 and 273 d after application. Only 4 of 15 lysimeters consistently contained detectable residues. Maximum picloram levels in soil solution were 130, 450, and 191 mg m<sup>-3</sup> for ridge, midslope, and toe-slope positions, respectively. Downstream monitoring began 4 d after the herbicide application, and an initial concentration of 68 mg m<sup>-3</sup> of picloram was detected. The maximum downstream concentration of 77 mg m<sup>-3</sup> occurred 18 d after the application, immediately after the second storm event. Downstream levels dropped to less than 10 mg m<sup>-3</sup> after 90 d and to less than 2 mg m<sup>-3</sup> after 200 d. Following localized retreatment along the stream more than a year after the initial treatment, levels climbed again into the 20 to 30 mg m<sup>-3</sup> range. Most of the initial off-site movement came from a perennial stream the had been inadvertently treated, but subsequently storm runoff was the largest contributor to stream contamination. Picloram residues in this stream were similar to those observed downstream, but they were higher (up to 241 mg m<sup>-3</sup> and dropped faster to below 2 mg m<sup>-3</sup> after D 150. Journal of environmental quality. Jan/Mar 1989. v. 18 (1). p. 89-95. maps. Includes references. (NAL Call No.: DNAL QH540.J6).

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**Pollutants in the air and acids in the rain.**  
JDARD. Cowling, E.B. Urbana, Ill. : International Society of Arboriculture. Journal of arboriculture. Mar 1987. v. 13 (3). p. 70-77. (NAL Call No.: DNAL SB436.J6).

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**Rapid dissipation of glyphosate in small forest ponds.**  
AECTCV. Goldsborough, L.G. Beck, A.E. New York, N.Y. : Springer-Verlag. Archives of environmental contamination and toxicology. July/Aug 1989. v. 18 (4). p. 537-544. Includes references. (NAL Call No.: DNAL TD172.A7).

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**Residues from organic arsenical herbicides in chemically thinned forests.**  
JEVQAA. Newton, M. Madison, Wis. : American Society of Agronomy. Journal of environmental quality. Oct/Dec 1986. v. 15 (4). p. 388-394. Includes references. (NAL Call No.: DNAL QH540.J6).

6145

**Sensitivity of forest plant reproduction to long-range transported air pollutants: the effects of wet deposited acidity and copper on reproduction of *Populus tremuloides*.**  
NEPHA. Cox, R.M. New York, N.Y. : Cambridge University Press. The New phytologist. Sept 1988. v. 110 (1). p. 33-38. Includes references. (NAL Call No.: DNAL 450 N42).

6146

**S02 effects on plant community function.**  
Lauenroth, W.K. Milchunas, D.G. Stanford, Calif. : Stanford University Press, 1985. Sulfur dioxide and vegetation : physiology, ecology, and policy issues / edited by William E. Winner, Harold A. Mooney, and Robert A. Goldstein. p. 454-477. (NAL Call No.: DNAL QK753.S85S85).

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**S02 effects on plant community structure.**  
Kozlowski, T.T. Stanford, Calif. : Stanford University Press, 1985. Sulfur dioxide and vegetation : physiology, ecology, and policy issues / edited by William E. Winner, Harold A. Mooney, and Robert A. Goldstein. p. 431-453. ill. (NAL Call No.: DNAL QK753.S85S85).

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**Studies on the vaporization of pentachlorophenol from treated wood.**  
AECTCV. Ingram, L.L. Jr. McGinnis, G.D.; Gjovik, L.R. New York, N.Y. : Springer-Verlag. Archives of environmental contamination and toxicology. Nov 1986. v. 15 (6). p. 669-676. ill. Includes references. (NAL Call No.: DNAL TD172.A7).

6149

**Sugar maple decline, acid rain, pest interactions in the Northeast.**  
Lachance, D. Bethesda, Md. : The Society. Proceedings of the ... Society of American Foresters National Convention. Meeting held Oct 16-19, 1988, Rochester, New York. 1989. p. 102-105. Includes references. (NAL Call No.: DNAL SD143.S64).

6150

**Time-dependent responses of trees to weather variations: an application of the Kalman filter.**  
Visser, H. Molenaar, J. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 579-590. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

6151

**Trace metal uptake and accumulation in trees as affected by environmental pollution /C.F. Baes and S.B. McLaughlin.**  
Baes, Charles F., 1924-. McLaughlin, Samuel B. Oak Ridge, Tenn. : Environmental Sciences Division, Oak Ridge National Laboratory, 1985 . Caption title.~ "Conf-8505156--3."~ "DE86 O11078."~ "Publication 2571.". 14, 5 p. : ill. Bibliography: leaves 12-14. (NAL Call No.: DNAL SB765.B3).

6152

**Transport and deposition of air pollutants on terrestrial vegetation and soils.**  
AESTC. Hicks, B.B. Johnson, W.B. New York, N.Y. : John Wiley & Sons. Advances in environmental science and technology. 1986. v. 18. p. 253-261. (NAL Call No.: DNAL TD180.A3).

6153

**Tree-growth, ARMA modelling and pollution.**  
Serre-Bachet, F. Washington, DC : U.S. Department of Energy, Office of Energy Research, 1986. Proceedings of the International Symposium on Ecological Aspects of Tree-Ring Analysis / compiled by G.C. Jacoby, J.W. Hornbeck. p. 591-598. maps. Includes references. (NAL Call No.: DNAL QK477.2.A6I5 1986).

6154

**Tree root depth relative to landfill tolerance.**  
HJHSA. Gilman, E.F. Alexandria, Va. : American Society for Horticultural Science. HortScience. Oct 1989. v. 24 (5). p. 857. Includes references. (NAL Call No.: DNAL SB1.H6).

6155

**Ultrastructure in leaves of Fagus silvatica and Carpinus betulus individuals tolerant and susceptible to SO2 and heavy metal pollutants.**  
EESAD. Stirban, M. Craciun, C.; Bathory, D. Duluth, Minn. : Academic Press. Ecotoxicology and environmental safety. Aug 1988. v. 16 (1). p. 45-56. ill. Includes references. (NAL Call No.: DNAL QH545.A1E29).

6156

**Vegetation management in the Coastal Plain/Piedmont final environmental impact statement : record of decision, USDA Forest Service.**  
Atlanta, Ga.? : The Service, 1989 : Cover title.~ "February 27, 1989.". 1 v. (various pagings) ; 28 cm. Includes bibliographical references. (NAL Call No.: DNAL aTD194.5.V44).

6157

**Watershed losses of triclopyr after aerial application to release spruce-fir.**  
PNWSB. Smith, C.T. McCormack, M.L. Jr. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January 6, 7 & 8, 1988 in Hartford, Connecticut. 1988. v. 42. p. 104-108. Includes references. (NAL Call No.: DNAL 79.9 N814).



# MATHEMATICS AND STATISTICS

6158

**Application of an evapotranspiration model to estimating understory removal effects in a douglas-fir forest.**

Kelliher, F.M. Black, T.A. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 259-262. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

6159

**Application of growth models for simulating genetic gain of loblolly pine.**

FOSCA. Knowe, S.A. Foster, G.S. Bethesda, Md. Society of American Foresters. A technique for predicting genetic gain in progeny tests using height-age models and stand-stimulations is presented for loblolly pine (*Pinus taeda* L.). Periodic remeasurements for a block-plot open-pollinated progeny test are used to examine trends in height growth, selection differential, and percent gain in height and volume. Using the Chapman-Richards model and approximate F tests, significant differences among families were detected in asymptote and rate parameters but not for the shape parameter. Separate base-age invariant height-age equations were developed for each family to account for polymorphism associated with the rate parameter. Selection differential calculated from either observed or predicted heights exhibited similar-trends although estimates from the height-age equations are consistently higher than obtained with observed height after age 5. Family rankings using the height-age models are consistent with those obtained using observed heights. Also, percent gain calculated from predicted heights is within 2% of the estimates obtained with observed heights at ages greater than 3 years. Differences in survival, height, and diameter were combined to examine trends in volume production associated with families. Predicted volume for each family was simulated using a bivariate distribution of height and diameter accounting for differences in height-growth patterns among families. Family rankings for volume are also closely correlated, resulting in two or three of the same families being selected using observed and predicted data. Selection differential obtained from simulated and observed volume fluctuates in rank producing a satisfactory trend based on predicted volume after age 5. Gain based on simulated volume tends to be slightly greater than gain based on observed volume. Estimates of percent gain obtained by reinitializing the simulations with quadratic mean dbh and residual trees per acre after thinning differed more from the observed trends than Forest science. Mar 1989. v. 35 (1). p. 211-228. Includes references. (NAL Call No.: DNAL 99.8 F7632).

6160

**Applied plant growth models for grazinglands, forests, and crops.**

Joyce, L.A. Kickert, R.N. Boca Raton, Fla. : CRC Press, 1987. Plant growth modeling for resource management / editors, Karin Wisiol, J.D. Hesketh. Literature review. v. 1 p. 17-55. Includes references. (NAL Call No.: DNAL QK731.P593).

6161

**Basic mathematical programming applications in weed control in forests.**

SWSPBE. Bullard, S.H. Richardson, R.O. Jr.; Straka, T.J. Raleigh, N.C. : The Society . Proceedings - Southern Weed Science Society. Meeting held on January 12-14, 1987, Orlando, Florida. 1987. (40). p. 195-198. Includes references. (NAL Call No.: DNAL 79.9 S08 (P)).

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**Community dynamics and topographic controls on forest pattern in Shenandoah National Park, Virginia.**

BTBCAL. Harrison, E.A. McIntyre, B.M.; Dueser, R.D. Bronx, N.Y. : The Club. The Bulletin of the Torrey Botanical Club. Jan/Mar 1989. v. 116 (1). p. 1-14. maps. Includes references. (NAL Call No.: DNAL 451 T63B).

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**Defensive strategies of woody plants against different insect-feeding guilds in relation to plant ecological strategies and intimacy of association with insects.**

Mattson, W.J. Lawrence, R.K.; Haack, R.A.; Herms, D.A.; Charles, P.J. New York : Springer-Verlag, c1988. Mechanisms of woody plant defences against insects : search for pattern / William J. Mattson, Jean Levieux, C. Bernard-Dagan, editors. Literature review. p. 3-38. ill. Includes references. (NAL Call No.: DNAL SB761.M46).

6164

**Degree growth stage model and rest-breaking mechanisms in temperate woody perennials.**

HJHSA. Fuchigami, L.H. Nee, C.C. Alexandria, Va. : American Society for Horticultural Science. HortScience. Paper presented at the "Symposium on Mechanisms of Rest and Dormancy of the XXII International Horticultural Congress/83rd ASHS Annual Meeting," August 12, 1986, Davis, California.~ Literature review. Oct 1987. v. 22 (5). p. 836-845. ill. Includes references. (NAL Call No.: DNAL SB1.H6).



6165

**Development and mortality of *Ips avulsus* (Coleoptera: Scolytidae) at constant temperatures.**

EVETEX. Wagner, T.L. Hennier, P.B.; Flamm, R.O.; Coulson, R.N. College Park, Md. : Entomological Society of America. Aspects of the development and mortality of *Ips avulsus* (Eichhoff) were studied at seven constant temperatures from 10 to 35 degrees C. On average, eggs occupied 10.3% of the total time in the host, larvae 34.8%, pupae 11.8%, and teneral adults 43.1%. Plots of development rates (reciprocal of median times) and percent mortalities versus constant temperatures indicated that the insect is well adapted to high temperatures but sensitive to low temperatures. The timing of oviposition relative to sibling oviposition time in a slab had little effect on the development times of any life stage or the life cycle. Oviposition time influenced life-stage and life-cycle mortality, although the effects were not great. For example, the probability of larval death increased from 16.6 to 28.7% for individuals originating in the first and fourth quarters of the oviposition period. The probability of death due to cannibalism was less than 10% and was not influenced by oviposition time. No difference was observed in the overall proportion of males to total emerging beetles (0.496) and 0.5; however, this proportion increased with time throughout the emergence period. Models were developed to predict life-stage and life-cycle development times as functions of temperature. A mechanistic model described the development rate versus constant temperature relationship, whereas a cumulative Weibull function described the temperature-independent distributions of normalized development times. The life-cycle model was validated using a multiple-cohort simulation procedure and data of *I. avulsus* emergence from three trees in each of three field plots. The validation indicated model suitability in a larger model of population dynamics, although additional testing is indicated. Environmental entomology. Apr 1988. v. 17 (2). p. 181-191. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Development and verification on models of freezing tolerance for Douglas-fir populations in the inland Northwest.**

XFINA. Rehfeldt, G.E. Ogden, Utah : The Station. USDA Forest Service research note INT - United States Intermountain Forest and Range Experiment Station. July 1986. (369). 5 p. maps. Includes references. (NAL Call No.: DNAL A99.9 F764UN).

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**Economic analysis of vegetation management.**

SWSPB. Kuch, P.J. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 347-353. Includes 3 references. (NAL Call No.: DNAL 79.9 S08).

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**An economic approach to evaluating timber management research.**

Teeter, L.D. Huang, Y.S. New Orleans, La. : The Station. General technical report SO - U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. Paper presented at the Fifth Biennial Southern Silvicultural Research Conference, Nov 1-3, 1988, Memphis, Tennessee. 1989. (74). p. 373-378. Includes references. (NAL Call No.: DNAL aSD11.U57).

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**An economic assessment of risk and returns from prescribed burning on tallgrass prairie.**

JRMGA. Bernardo, D.U. Engle, D.M.; McCollum, E.T. Denver, Colo. : Society for Range Management. Journal of range management. Mar 1988. v. 41 (2). p. 178-183. Includes references. (NAL Call No.: DNAL 60.18 J82).

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**Economics of dutch elm disease control: a model and case study.**

JFUSA. Baughman, M.J. Bethesda, Md. : Society of American Foresters. Journal of forestry. Sept 1985. v. 83 (9). p. 554-557. Includes references. (NAL Call No.: DNAL 99.8 F768).

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**Effects and adjustments of competition bias in progeny trials with single-tree plots.**

FDSCA. Magnussen, S. Bethesda, Md. : Society of American Foresters. A competition model based on the height difference between a subject tree and its neighbors was used to adjust annual growth data (age 1-5) in a close-spaced single tree plot trial of 25 open-pollinated *Pinus banksiana* progenies. Competition effects in tree height, basal area, and volume growth were estimated within each of eight classes of dominance suppression. This procedure allowed a differential adjustment of family performances to their large plot expectations. It is limited to the absence of competition effects on height growth. Response to competition was the same in all families. Variance components and heritability estimates of basal area and stem volume were inordinately inflated by competition. Forest science. June 1989. v. 35



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(2). p. 532-547. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Effects of moisture before and after laboratory spray application of insecticides to western spruce budworm (Lepidoptera: Tortricidae).**

JEENAI. Robertson, J.L. Preisler, H.K. Lanham, Md. : Entomological Society of America. Journal of economic entomology. Dec 1988. v. 81 (6). p. 1678-1680. Includes references. (NAL Call No.: DNAL 421 J822).

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**Enhancement of baculovirus activity on gypsy moth (Lepidoptera: Lymantriidae) by chitinase.**

JEENAI. Shapiro, M. Preisler, H.K.; Robertson, J.L. Lanham, Md. : Entomological Society of America. Chitinase significantly enhanced the activity of nuclear polyhedrosis viruses (NPV) ingested by second-instar gypsy moth, *Lymantria dispar* (L.). Multiple probit regressions calculated from mortality observed at 14 and 21 d indicated that the LC50's of NPV declined 1.3-, 2.0-, 3.2-, and 5.4-fold with the addition of 0.001, 0.010, 0.10, and 1.00% chitinase, respectively. In addition, insects exposed to NPV-chitinase combinations died more rapidly than those that ingested NPV only. Journal of economic entomology. Dec 1987. v. 80 (6). p. 1113-1116. Includes references. (NAL Call No.: DNAL 421 J822).

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**Estimating oak leaf area index and gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), defoliation using canopy photographs.**

EVETEX. Liebhold, A.M. Elkinton, J.S.; Miller, D.R.; Wang, Y.S. College Park, Md. : Entomological Society of America. Abstract: Oak leaf area index was (LAI) was estimated using wide-angle photographs of the forest canopy taken from the ground at grid points throughout three sites on Cape Cod, Mass. Confidence intervals for these estimates and optimal sample sizes were calculated. Oak LAI estimates leveled off by early June when no defoliation was present. Within-plot two-dimensional spatial distribution of oak LAI was very similar to the spatial distribution of oak basal area. Consequently, there was a positive correlation between local oak leaf area and local basal area. Comparison of LAI estimates taken before and after gypsy moth, *Lymantria dispar* (L.), defoliation allowed the estimation of oak leaf area consumed. Leaf area loss was similar in areas of high and low host foliage densities. The correlation of leaf area lost with local density of early instars was greater than the correlation with the density of late instars. Environmental entomology. June 1988. v. 17 (3). p. 560-566. ill., maps. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Forest-bark beetle interactions: stand dynamics and prognoses.**

Crookston, N.L. Stark, R.W. New York : Wiley, c1985. Integrated pest management in pine-bark beetle ecosystems / edited by William E. Waters, Ronald W. Stark, David L. Wood. p. 81-103. ill. (NAL Call No.: DNAL SB608.P65I58).

6176

**Mathematical analysis and modeling of epidemics of rubber tree root diseases: probability of infection of an individual tree.**

FOSCA. Chadoeuf, J. Joannes, H.; Nandris, D.; Pierrat, J.C. Bethesda, Md. : Society of American Foresters. The spread of root diseases in rubber tree (*Hevea brasiliensis*) due to *Rigidoporus lignosus* and *Phellinus noxius* was investigated epidemiologically using data collected every 6 months during a 6-year survey in a plantation. The aim of the present study is to see what factors could predict whether a given tree would be infested at the following inspection. Using a qualitative regression method we expressed the probability of pathogenic attack on a tree in terms of three factors: the state of health of the surrounding trees, the method used to clear the forest prior to planting, and evolution with time. The effects of each factor were ranked, and the roles of the various classes of neighbors were established and quantified. Variability between successive inspections was small, and the method of forest clearing was important only while primary inocula in the soil were still infectious. The state of health of the immediate neighbors was most significant; more distant neighbors in the same row had some effect; interrow spread was extremely rare. This investigation dealt only with trees as individuals, and further study of the interrelationships of groups of trees is needed. For. SCI. 34(4):831-845. Forest science. Dec 1988. v. 34 (4). p. 831-845. Includes references. (NAL Call No.: DNAL 99.8 F7632).

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**Modeling control strategies for laminated root rot in managed Douglas-fir stands: model development.**

PHYTAJ. Bloomberg, W.J. St. Paul, Minn. : American Phytopathological Society. Phytopathology. Apr 1988. v. 78 (4). p. 403-409. ill., maps. Includes references. (NAL Call No.: DNAL 464.8 P56).

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**Modeling the effect of thinning on tree water use.**

Spittlehouse, D.L. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24,



1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 256-258. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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**Modeling the feasibility of free-air carbon dioxide releases for vegetation response research.**

Allen, L.H. Jr. Beladi, S.E.; Shinn, J.H. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 161-164. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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**Modeling the total evaporation and water balance of a forest canopy.**

Chassagneux, P.G. Choisnel, E.M. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 263-264. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

6181

**Monitoring bark beetle populations and beetle-caused damage.**

Waters, W.E. New York : Wiley, c1985. Integrated pest management in pine-bark beetle ecosystems / edited by William E. Waters, Ronald W. Stark, David L. Wood. p. 141-175. (NAL Call No.: DNAL SB608.P65I58).

6182

**Nitrogen isotope fractionation in burned and unburned chaparral soils.**

SSSJD4. Herman, D.J. Rundel, P.W. Madison, Wis. : The Society. Plant and soil processes involving N-transformations have been monitored by techniques measuring the  $15\text{N}/14\text{N}$  ratio in a sample relative to the atmosphere ( $\delta 15\text{N}$ ). Usually low  $\delta 15\text{N}$  values have been reported in the tissues of chaparral shrubs. The primary objective of this study was to investigate soil N-cycling processes which may yield the low plant tissue  $\delta 15\text{N}$  levels. Since the chaparral is subject to periodic brush fires, which in turn result in high levels of inorganic N-forms in the soil during the first year following the burn, possible effects of burning on soil  $\delta 15\text{N}$  were also investigated. Incubations were conducted on soils from an area which had been subjected to a brush fire, and an adjacent unburned area; both soils are fine, thermic, schistose, very

steep Ultic Haploxeralfs. Concentrations and  $\delta 15\text{N}$  of soil  $\text{NH}_4(1+)$  and  $\text{NO}_3(-1)$  were periodically measured. A C- and N-rich ash resulted in rapid mineralization of N in the burned soil; a substrate more resistant to biological degradation resulted in an initial loss, then subsequent slow accumulation of inorganic-N in the unburned soil. Nitrate was the dominant mineral species in each soil after a few weeks. As nitrification progressed,  $\delta 15\text{N}$  of  $\text{NH}_4(1+)$  increased and  $\delta 15\text{N}$  of  $\text{NO}_3(-1)$  decreased. Since the mineral pool in each soil became dominated by  $\text{NO}_3(-1)$   $\delta 15\text{N}$  of the mineral pool became strongly negative. A mathematical model of isotope dynamics fits empirical data well. Soil Science Society of America journal. July/Aug 1989. v. 53 (4). p. 1229-1236. Includes references. (NAL Call No.: DNAL 56.9 S03).

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**On the origin of growth stresses in trees. 2. Stresses generated in a tissue of developing cells.**

WOSTBE. Archer, R.R. Secaucus, N.J. : Springer-Verlag. Wood science and technology. 1989. v. 23 (4). p. 311-322. Includes references. (NAL Call No.: DNAL SD433.A1W6).

6184

**Stochastic phenology model for the western spruce budworm (Lepidoptera: Tortricidae).**

EVETEX. Kemp, W.P. Dennis, B.; Beckwith, R.C. College Park, Md. : Entomological Society of America. Environmental entomology. Includes statistical data. June 1986. v. 15 (3). p. 547-554. Includes references. (NAL Call No.: DNAL QL461.E532).

6185

**Tissue culture and leaf spot bioassays as variables in regression models explaining Hypoxylon mammatum incidence on Populus tremuloides clones in the field.**

PHYTAJ. Belanger, R.R. Falk, S.P.; Manion, P.D.; Griffin, D.H. St. Paul, Minn. : American Phytopathological Society. Regression models were used to interpret the relationships among sensitivity of aspen to metabolites produced by Hypoxylon mammatum, disease incidence in the field, and several other clone and site variables. Twenty-nine naturally occurring aspen clones in central New York were intensively surveyed. Dormant buds of 10 clones representing the range of variation in infection were cultured and bioassayed with culture filtrates of H. mammatum to compare with bioassays of leaves collected in the field. Bioassay systems based on tissue culture and field collections demonstrated the occurrence of clonal differences in response to metabolites produced by H. mammatum. High positive correlations among bioassays, with various fungal isolates, supported the conclusion that clonal response to metabolites



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is genetically controlled. However, low correlations of toxin assays with various measures of disease did not support the theory of a direct relationship between disease incidence and toxin assays. Rather, an interaction of the toxin assay with other clonal and site variables in regression models was required to explain the variation in disease incidence in the field. *Phytopathology*. Mar 1989. v. 79 (3). p. 318-321. ill. Includes references. (NAL Call No.: DNAL 464.8 P56).

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6186

## **An automated objective prediction package for the spread of southern pine beetle.**

Michaels, P.J. Sappington, D.E.; Stenger, P.J. Boston : The Society, 1985. 17th Conference on Agricultural and Forest Meteorology and seventh Conference on Biometeorology and Aerobiology, May 21-24, 1985, Scottsdale, Ariz. : preprint volume / sponsored by the American Meteorological Society. p. 70-73. maps. Includes references. (NAL Call No.: DNAL S600.2.C6 1985).

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## **Computer based geographic information systems for regional decisions in pest management.**

MUCBA. Gage, S.H. Simmons, G.A.; Parks, B.O. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 52-58. maps. Includes references. (NAL Call No.: DNAL 275.29 M58B).

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## **Computer prediction of insecticide efficacy for western spruce budworm and Douglas-fir Tussock moth susceptible, tolerant, resistant**

/Jacqueline L. Robertson, Molly W. Stock. --. Robertson, Jacqueline L. Stock, Molly W. Berkeley, Calif. : USDA, Forest Service, Pacific Southwest Forest and Range Experiment Station, 1986. Cover title. ~ "April 1986" -- p. 2 of cover. i, 11 p. : ill. ; 28 cm. --. Bibliography: p. 11. (NAL Call No.: DNAL aSD11.A325 no.89).

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## **A decision support system for the southern pine beetle.**

Coulson, R.N. Saunders, M.C.; Loh, K.D.; Rykiel, E.J.; Payne, T.L.; Pulley, P.E.; Hu, L.C. Baton Rouge, La. : Louisiana State University, Division of Continuing Education. Annual forestry symposium. 1985. (34th). p. 35-46. ill. Includes references. (NAL Call No.: DNAL 99.9 L935).

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## **The development of a computerized database management system for Midland County.**

MUCBA. Gage, S.H. Wirth, T.M. East Lansing, Mich. : The Service. Extension bulletin E - Cooperative Extension Service, Michigan State University. In the series analytic: The Second annual report of the Gypsy Moth Technical Committee: Gypsy moth in Michigan, 1987 / edited by Bruce A. Montgomery. May 1988. (2142). p. 50-51. (NAL Call No.: DNAL 275.29

M58B).

6191

## **Development of a herbicide data base for the Southeastern United States forestry sector.**

SWSPB. Cantrell, R.L. Champaign : The Society. Proceedings - Southern Weed Science Society. Paper presented at the 38th Annual Meeting of the Southern Weed Science Society, "Challenges in Food Production" Jan. 14/16, 1985, Houston, Texas. 1985. v. 38. p. 257-262. Includes 4 references. (NAL Call No.: DNAL 79.9 S08).

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## **The effect of drought on growth decline of loblolly pine on littleleaf sites.**

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## **Effects of aerial detection schedules on the age of southern pine beetle infestations.**

FOSCA. De Steiguer, J.E. Hedden, R.L. Bethesda, Md. : Society of American Foresters. Forest science. Mar 1988. v. 34 (1). p. 229-235. Includes references. (NAL Call No.: DNAL 99.8 F7632).

6194

## **Environmental monitoring of spruce budworm suppression programs in the eastern United States and Canada an annotated bibliography.**

MAMRA. Trial, J.G. Orono, Me. : The Station. Miscellaneous report - University of Maine Agricultural Experiment Station. Bibliography. Apr 1986. (312). 36 p. (NAL Call No.: DNAL 100 M28M).

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## **Gauging the biological impacts of the greenhouse effect.**

BISNA. Cohn, J.P. Washington, D.C. : The Institute. BioScience - American Institute of Biological Sciences. Mar 1989. v. 39 (3). p. 142-146. ill. (NAL Call No.: DNAL 500 AM322A).

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## **Inland Empire Vegetation Management Working Group.**

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**Integrated computer decision support for forest impact assessment: a conceptual framework and example.**

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**Knowledge system environment for integrated pest management in forest landscapes: the southern pine beetle (Coleoptera: Scolytidae).**

Coulson, R.N. Saunders, M.C.; Loh, D.K.; Oliveria, F.L.; Drummond, D.; Barry, P.J.; Swain, K.M. Lanham, Md. : The Society. Bulletin of the Entomological Society of America. Summer 1989. v. 35 (2). p. 26-32. Includes references. (NAL Call No.: DNAL 423.9 EN8).

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Saunders, M.C. Loh, D.K.; Rykiel, E.J.; Coulson, R.N.; Payne, T.L.; Pulley, P.E.; Sharpe, P.J.H.; Hu, L. Florence, Ala. : The Institute. c1985. Software solutions : proceedings: symposium, software fair and 2nd Annual Meeting of Forest Resources System Institute, April 21-24, 1985, Clarksville, Indiana / edited by J.G. Massey, B.J. Greber, T.M. p. 92-103. ill. Includes references. (NAL Call No.: DNAL SD381.5.S62).

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**Stochastic model of insect phenology: estimation and testing.**

EVETEX. Dennis, B. Kemp, W.P.; Beckwith, R.C. College Park, Md. : Entomological Society of America. Environmental entomology. Includes statistical data. June 1986. v. 15 (3). p. 540-546. Includes references. (NAL Call No.: DNAL QL461.E532).

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**Systems analysis for large-scale forest protection programs: operational modeling in a spruce budworm spray project.**

JFUSA. Rumpf, D.L. Rumpf, T.A.; Melachrinoudis, E. Bethesda, Md. : Society of American Foresters. Journal of forestry. Feb 1988. v. 86 (2). p. 18-24. ill., maps. Includes references. (NAL Call No.: DNAL 99.8 F768).

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**Trees for solar control.**

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**Using computer graphics to assess the visual impact of limb rust in ponderosa pine.**

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# HUMAN MEDICINE, HEALTH AND SAFETY

6206

**Burning cacodylic acid-treated oak trees: how safe?.**

FPJOA. Woolson, E.A. Madison, Wis. : Forest Products Research Society. Forest products journal. May 1986. v. 36 (5). p. 49-52. Includes references. (NAL Call No.: DNAL 99.9 F7662J).

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**Draft environmental impact statement for managing competing and unwanted vegetation /USDA Forest Service, Pacific Northwest Region ; states of Oregon and Washington and portions of California and Idaho.**

Portland, Or. : The Region, 1987. Cover title: Managing competing and unwanted vegetation, draft environmental impact statement.~ Spine title: DEIS, Managing competing and unwanted vegetation.~ "October 1987"--Cover.~ Includes index. 2 v. : ill., maps ; 28 cm. Bibliography: 1st vol. p. References, p. 1-24. (NAL Call No.: DNAL aSB951.4.D7).

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**Effect of burning on hexazinone residues in firewood.**

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**Exposure of applicators to monosodium methanearsonate and cacodylic acid in forestry.**

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**Exposure of forestry ground workers to 2,4-D, picloram and dichlorprop.**

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**Forest herbicide safety: environmental concerns and proper handling procedures.**

Mitchell, R.J. Balch, T. Atlanta, GA : USDA Forest Service, Southern Region, 1988. A Manual on ground applications of forestry herbicides / edited by James H. Miller, Robert J. Mitchell.

p. 7/1-7/6. (NAL Call No.: DNAL aSB951.4.M36).

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**Herbicide worker exposure study.**

PNWSB. Allen, B.M. College Park, Md. : The Society. Proceedings of the annual meeting - Northeastern Weed Science Society. Meeting held January, 6-8, 1988, Hartford, Connecticut. 1988. v. 42 (suppl.). p. 37-40. Includes references. (NAL Call No.: DNAL 79.9 N814).

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**Human health risk assessment for the use of pesticides in USDA Forest Service nurseries /Labat-Anderson, Incorporated ; Larry L. Gross, project leader.**

Gross, Larry L. Washington, D.C.? : United States Dept. of Agriculture, Forest Service, 1987?. "October 1987."~ "Prepared for the U.S. Department of Agriculture, Forest Service, Forest Pest Management, under contract 53-3187-4-22." 1 v. (various pagings) : ill. ; 28 cm. Bibliography: p. Ref-1 - Ref-15. (NAL Call No.: DNAL aRA1270.P4H8).

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**Pesticide drift: toxicological and social consequences.**

ACSMC. Witt, J.M. Washington, D.C. : The Society. ACS Symposium series - American Chemical Society. 1985. (273). p. 493-508. Includes 6 references. (NAL Call No.: DNAL QD1.A45).

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**Residues of lindane and chlorpyrifos in firewood and woodsmoke.**

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Tacoma, WA : Mediatek, 1986? . Pesticide application training collection. 206 slides : col. + 1 sound cassette (30 min. : mono, 7 1/2 ips) + 1 presentation manual. (NAL Call No.: DNAL Slide no.207).

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**Volatile emissions from Douglas-fir heartwood treated with Vapam or methylisothiocyanate.**

FPJDA. Morrell, J.J. Lebow, S.T. Madison, Wis.  
: Forest Products Research Society. Fumigants, which play an important role in arresting and preventing decay of wood exposed to the weather, have recently been used to control decay in building timbers. The possibility exists that chemicals could migrate through the wood and be emitted inside buildings, thus posing a health hazard. Emission rates from blocks of Douglas-fir heartwood, treated with Vapam or methylisothiocyanate (MIT), were measured by placing the blocks in tanks under a stable air-flow and then analyzing air samples by gas chromatography at regular intervals. Three sulfur compounds were detected: carbon disulfide, carbonyl sulfide, and MIT. Emissions from wood treated with MIT were generally higher than those from Vapam-treated wood. Although our results indicated that emissions were detectable for at least 1 year after treatment, levels were extremely low and should not be a problem in storage buildings or in factories where air exchange is high. Fumigant treatment of wood used in tightly sealed buildings that are continually inhabited is not recommended. Forest products journal. Feb 1989. v. 39 (2). p. 41-44. Includes references. (NAL Call No.: DNAL 99.9 F7662J).



# TECHNOLOGY

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